FOURTEENTH CENSUS OF THE UNITED STATES: 1920

DEPARTMENT OF COMMERCE

BULLETIN

BUREAU OF THE CENSUS

IRRIGATION : NORTH DAKOTA

STATISTICS FOR THE STATE AND ITS COUNTIES

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INTRODUCTION.

This bulletin presents the statistics of irrigation for the state of North Dakota, collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the bulletin figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	77,690	74,360	3,330	4.5
Approximate land area of the state—acres	44,917,120	44,917,120		
All land in farms—acres	36,214,751	28,426,650	7,788,101	27.4
Improved land in farms—acres	24,563,178	20,455,092	4,108,086	20.1
Number of farms irrigated	340	69	271	
Area irrigated—acres	12,072	10,248	1,824	17.8
Area enterprises were capable of irrigating—acres	34,235	21,917	12,318	56.2
Area included in enterprises—acres	57,476	38,173	19,303	50.6
Per cent irrigated:				
Number of all farms	0.4	0.1	0.3	
Approximate land area of state	(2)	(2)		
Land in farms	(2)	(2)		
Improved land in farms	(2)	0.1		
Excess of area enterprises were capable of irrigating over area irrigated—acres	22,163	11,669	10,494	89.9
Excess of area included in enterprises over area irrigated—acres	45,404	27,925	17,479	62.6
Capital invested	$1,857,118	$836,482	$1,020,636	122.0
Average per acre enterprises were capable of irrigating	$54.25	$38.17	$16.08	42.1
Estimated final cost of existing enterprises	$2,072,766	$836,482	$1,236,284	147.8
Average per acre included in enterprises	$36.06	$21.91	$14.15	64.6
Average cost of operation and maintenance per acre	$5.50	$28.40	—$22.90	—80.6

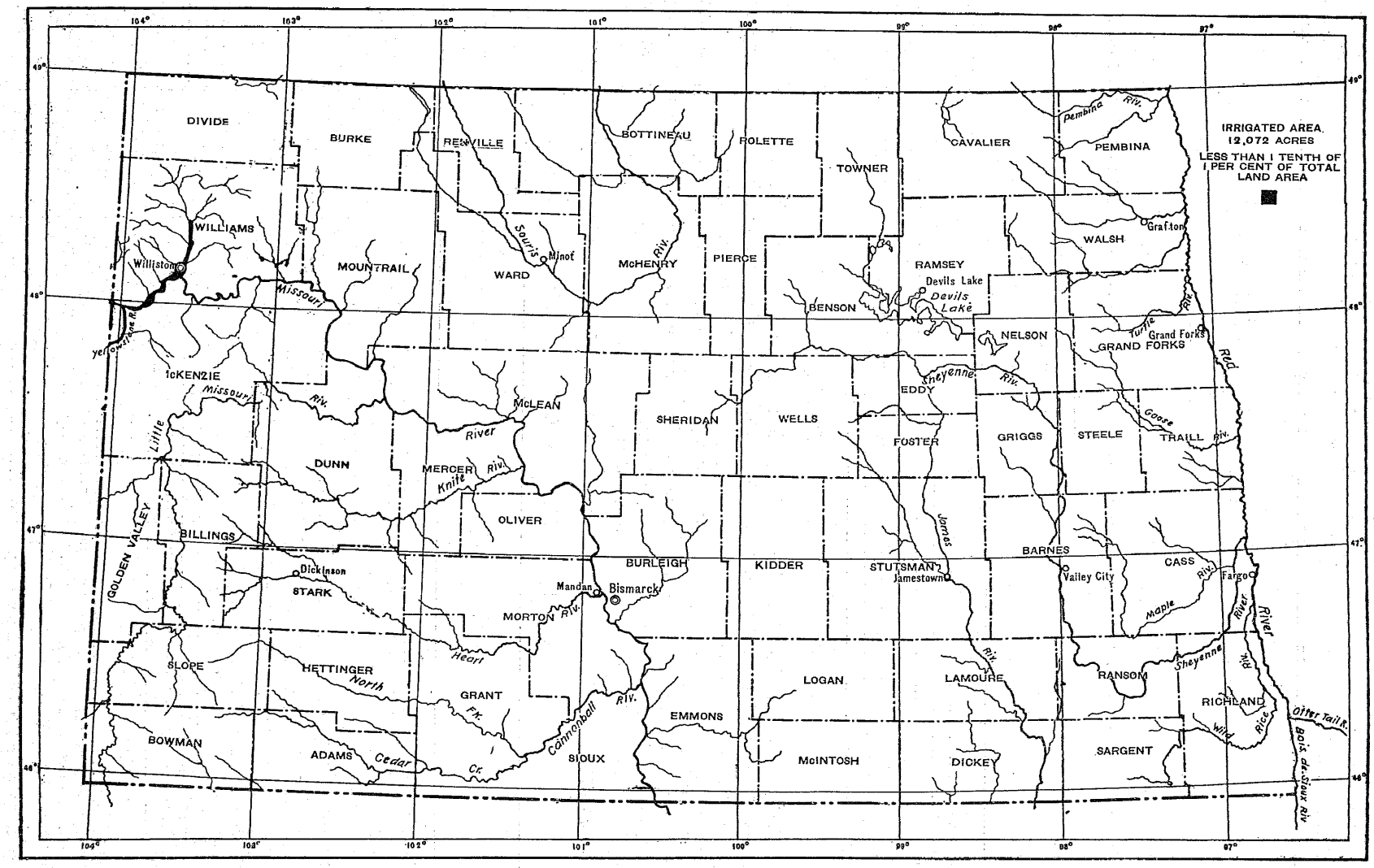
[1] A minus sign (—) denotes decrease. Per cent not shown when base is less than 100.

[2] Less than one-tenth of 1 per cent.

(2) 1.

NORTH DAKOTA

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.



EXPLANATION OF TERMS.

Farms irrigated.—The number of "farms irrigated" is the number on which irrigation is practiced, and for the purposes of this inquiry a "farm" is defined as for the general census of agriculture; that is, to be classed as a farm an establishment either must be 3 acres in extent or must have produced crops to the value of $250 in 1919, or must have required for its agricultural operations the continuous services of at least one person. "Number of farms irrigated" as used in this report and in that of 1910, is equivalent to the term "number of irrigators" used in census reports on irrigation previous to 1910.

Irrigation enterprise.—An "enterprise" is an independent irrigation establishment and includes the works for supplying water and the land to which water is supplied or is to be supplied, except that the cost or value of the land is not included in the "capital invested."

Acreage irrigated, in enterprises, and available for settlement.—Acreage irrigated is the acreage to which water was actually applied in the season preceding the census year—1919 for the Fourteenth Census and 1909 for the Thirteenth Census.

Acreage to which enterprises were capable of supplying water relates to the season following the time of taking the census and, consequently, is based on estimates made by those controlling the enterprises.

Acreage included in enterprises represents the extent of the plans of those controlling enterprises.

Acreage of irrigated land reported as available for settlement relates to land within existing enterprises and not to land that is susceptible of reclamation and settlement by new enterprises or extensions of existing enterprises.

Types of enterprises.—The types of enterprises under which all data are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands. In addition to serving land within its own projects, the United States Reclamation Service supplies stored water to land within other enterprises.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who may own no interest in the works.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization.

Capital invested.—The capital invested in irrigation enterprises is that reported by the owners. For the larger works the capital invested is taken, in most cases, from books of account and represents the actual investment. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the capital reported represents the owners' estimates. The schedules used in 1910 called for "cost," while the schedule used in the present census calls for "capital invested," but the instructions accompanying the schedules make these two terms equivalent. In both cases the investment includes cost of construction and of acquiring rights. The latter usually consists of filing fees only, but in some instances it includes the purchase price of rights. However, these cases are so rare that they are unimportant. The cost reported for 1900 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. For the Thirteenth and Fourteenth Censuses the average cost per acre is based on the acreage which enterprises were capable of irrigating in the census year and the cost to the date of the census—January 1, 1920, for the Fourteenth Census, and July 1, 1910, for the Thirteenth Census.

Operation and maintenance.—Cost of operation and maintenance was not reported on all schedules, and averages are based on the acreages for which cost is reported. No estimate of total cost of operation and maintenance for all irrigation enterprises has been made. In the case of enterprises operating pumping plants the cost of operation and maintenance includes cost of fuel and attendance.

Water rights.—The acreage irrigated has been classified by the character of rights under which water is received. The classes used are defined as follows:

"*Appropriation and use*" includes all rights acquired without formalities of any kind that have not been defined by the courts.

"*Notice filed and posted*" includes rights for which claims of some kind have been either posted or filed that have not been defined by the courts.

"*Adjudicated by court*" includes all rights that have been defined by the courts.

"*Permit from state*" includes all rights initiated under laws requiring any party wishing to acquire rights to obtain a permit from the state.

"*Certificate or license from the state*" includes rights acquired under laws providing for the issuing by the state of certificates or licenses defining rights acquired.

"*Riparian rights*" includes rights based on the ownership of riparian land.

"*Underground*" represents water taken from wells.

Source of water supply.—In classifying acreage by source of supply from which water for irrigation is obtained, in 1910 acreage was credited to what seemed to be the principal source of supply, while in the census of 1920 the attempt is made to represent the facts more nearly by presenting various mixed classes.

Date of beginning.—The date of beginning of irrigation enterprises is, in some cases, the date when construction began, and, in other cases, the date of filing a claim or of applying for a permit. If a filing or application for permit was made and work was begun and continued with reasonable diligence the date of filing is considered the date of beginning, otherwise the date of construction is taken as the date of beginning.

Drainage basin.—The drainage basin of a stream is all of the land drained by the stream and its tributaries.

Units of quantity and capacity.—Capacities of canals, reservoirs, wells, pumps, and engines, and quantities of water used are expressed in the units commonly used in engineering literature to express the same items. They are as follows:

Capacities of canals and volumes of flowing water are given in second-feet, a shorter equivalent for cubic feet per second.

Capacities of wells and pumps are given in gallons per minute. Four hundred and fifty gallons per minute equal 1 second-foot.

Capacities of reservoirs are given in acre-feet. An acre-foot is the quantity of water that will cover 1 acre to a depth of 1 foot. It equals 43,560 cubic feet.

Capacities of engines and motors are given in horsepower. One horsepower is the power required to lift 33,000 pounds through a vertical distance of 1 foot in 1 minute of time.

CLIMATIC CONDITIONS.

Throughout the state of North Dakota the precipitation is, in normal years, sufficient for the maturing of crops, without irrigation, the normal rainfall for the state being 17.92 inches. In the western part of the state, however, the precipitation is below the average for the state, and irrigation is practiced to a limited extent. In 1919 the precipitation was below the normal, being below 15 inches over most of the western half of the state, and below 10 inches over the southwestern part of the state. This low precipitation resulted in a short supply of water for irrigation where water is taken from small local streams, and it is probable that some land was not irrigated in 1919 which would have been if water had been available.

WATER SUPPLY FOR IRRIGATION.

The whole of that part of the state of North Dakota within which irrigation is practiced lies within the drainage basin of Missouri River and its tributaries. With the exception of the Missouri itself these streams are plains streams and subject to drouth when local rainfall fails. The Missouri is fed by mountain streams, and supplies sufficient water for the limited area receiving water from it.

There are many artesian wells in the state, but they are not used for irrigation.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	340	392.8	0.4	12,072	17.8	(1)	(1)	(1)
1910	69	27.8	0.1	10,248	110.3	(1)	(1)	0.1
1900	54	671.4	0.1	4,872	994.8	(1)	(1)	0.1
1890	7	.....	(1)	445	.....	(1)	(1)	(1)

[1] Less than one-tenth of 1 per cent.

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of acreage in enterprises.	
Total	30	57,476	12,072	21.0	34,235
1880–1889 [1]	3	2,100	595	28.3	1,060
1890–1899	5	2,130	458	21.5	1,520
1900–1904	9	4,967	955	19.2	3,255
1905–1909	2	46,031	8,766	19.0	26,238
1910–1914	1	325	285	87.7	325
1915–1919	6	1,128	330	29.3	1,042
Not reported	4	795	683	85.9	795

[1] Dakota territory.

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises [illegible] (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	12,072	10,248	1,824	17.8	34,235	[illegible]
Stream, gravity	9,030	7,153	1,877	26.2	21,241	[illegible]
Stream, pumped	2,469	1,614	855	53.0	12,298	[illegible]
Wells, pumped	.....	1	—1	.....	.....	.....
Springs	.....	200	—200	.....	.....	.....
Stored storm water	508	1,280	—772	—60.3	606	[illegible]
Other mixed	65	.....	65	.....	90	[illegible]

[1] A minus sign (—) denotes decrease.

ACREAGE, BY CHARACTER OF ENTERPRISE.

An irrigation district law was enacted in North Dakota in 1917, and a district has been organized to take over the Williston project of the United States Reclamation Service, but this project is credited to the Reclamation Service in Table 5 because the Government built the works and still controls them to a large extent.

North Dakota has not accepted the conditions of the Federal Carey Act (act of Congress, Aug. 18, 1894).

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
ACREAGE IRRIGATED.				
Total	12,072	10,248	1,824	17.8
Individual and partnership	3,306	8,638	—5,332	—61.7
U. S. Reclamation Service	8,766	1,610	7,156	444.5
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	34,235	21,917	12,318	56.2
Individual and partnership	7,997	9,821	—1,824	—18.6
U. S. Reclamation Service	26,238	12,096	14,142	116.9
ACREAGE INCLUDED IN ENTERPRISES.				
Total	57,476	38,173	19,303	50.6
Individual and partnership	11,445	13,693	—2,248	—16.4
U. S. Reclamation Service	46,031	24,480	21,551	88.0

[1] A minus sign (—) denotes decrease.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of North Dakota relating to water rights are summarized in the following paragraphs:

North Dakota was organized from a part of Dakota territory and admitted to the Union in 1889.

The constitution of the state made the following declaration regarding water: "All flowing streams and natural water sources shall forever remain the property of the state for mining, irrigation, and manufacturing purposes." (Sec. 210.)

In 1905 the state adopted a comprehensive code covering the subject of water rights.

This code contained the following general provision: "All waters within the limits of the state from all sources of water supply belong to the public and, except as to navigable waters, are subject to appropriation for beneficial use." (Laws 1905, ch. 34, sec. 1.)

Under this law any party wishing to acquire water rights is required to apply to the state engineer for a permit. When works are completed the state engineer issues a certificate of completion, and when water has been put to use a license is issued.

The law of 1905 provided the machinery for a complete adjudication of all rights to water. The state engineer was to make hydrographic surveys of all streams and ditches, and, when these surveys were completed, file reports with the attorney general of the state, "who shall, within 60 days thereafter, enter suit on behalf of the state for the determination of all rights to the use of such water." (Laws 1905, ch. 34, secs. 14 and 15.) Table 6 indicates that this provision of the law has not been carried out.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919.

CLASS.	1919	
	Acres.	Per cent of total.
Total	12,072	100.0
Appropriation and use	6,348	52.6
Notice filed and posted	2,328	19.3
Permit from state	2,936	24.3
Not reported	460	3.8

ACREAGE, BY DRAINAGE BASIN.

The report of a special irrigation census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were reported separately in such a way that it is not possible to tell in what drainage basin these areas are situated. This area is so small, however, that the comparisons are not affected seriously.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent increase.		
Total	12,072	10,384	16.3	57,476	34,235
Missouri River and tributaries	12,072	9,444	27.8	57,476	34,235
Mouse River and tributaries	(1)	676	.....	.....	.....
Red River of the North and tributaries	(1)	6	.....	.....	.....
Springs	(2)	256	.....	.....	.....
Wells	(2)	2	.....	.....	.....

[1] None reported in 1919. [2] Included in figures for streams.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.[1]	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.
1920	$1,857,118	122.0	$54.25	42.1
1910	836,482	.....	38.17	993.7
1900	16,980	.....	3.49	.....
1890	(2)	.....	.....	.....

[1] Per cent not shown when more than 1,000.
[2] Not reported in 1890.

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$1,857,118	100.0	$54.25
1880–1889[1]	8,000	0.4	7.55
1890–1899	17,669	1.0	11.62
1900–1904	37,714	2.0	11.59
1905–1909	1,777,570	95.7	67.75
1910–1914	2,000	0.1	6.15
1915–1919	11,207	0.6	10.76
Not reported	2,958	0.2	3.72

[1] Dakota territory.

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$1,857,118	100.0	$54.25	10,951	$5.50
Stream, gravity	1,299,951	70.0	61.20	8,485	3.55
Stream, pumped	552,007	29.7	44.89	2,466	12.21
Stored storm water	4,660	0.3	7.69	.....	.....
Other mixed	500	.....	5.56	.....	.....

[1] Based on area irrigated in 1919.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	Increase.
Total	$1,857,118	$45,087	$1,812,031
Missouri River and tributaries	1,857,118	40,375	1,816,743
Mouse River and tributaries	.....	3,637	.....
Red River of the North and tributaries	.....	300	.....
Springs	.....	600	.....
Wells	.....	175	.....

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$1,857,118	100.0	10,951	$5.50
Individual and partnership	81,693	4.4	2,185	0.79
U. S. Reclamation Service	1,775,425	95.6	8,766	6.67

[1] Based on area irrigated in 1919.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	8
Acreage included in enterprises reporting land drained or needing drainage	49,581
Acreage for which drains have been installed	1,613
Additional acreage needing drainage	659
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	3.3
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	2.8
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	4.0

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages. In all cases in which the quantity is reported the water was measured.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

Average volume entering canals	second-feet	130
Area irrigated in 1919	acres	8,766
Average number of acres per second-foot		67.4
Total quantity of water entering canals	acre-feet	28,106
Area irrigated in 1919	acres	8,766
Average quantity per acre	acre-feet	3.2
Total quantity delivered	acre-feet	11,636
Area irrigated in 1919	acres	8,766
Average quantity per acre	acre-feet	1.3

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.		Pipe lines, length (miles).	PUMPING PLANTS.			
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).		Number.	Engine capacity (horse-power).	Pumps.	
													Number.	Capacity (gallons per minute).
Total	26	11	32	836	58	58	93	9	1,110	0.3	4	88	10	51,250
1880-1889[1]	8	2	4	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....
1890-1899	2	4	7	28	7	5	2	1	140	.....	1	8	1	250
1900-1904	9	2	10	327	11	4	3	6	563	.....	.....	.....	.....	.....
1905-1909	.....	.....	2	371	26	22	6	.....	.....	0.3	2	60	8	50,000
1910-1914	2	1	1	100	1	25	81	.....	.....	.....	.....	.....	.....	.....
1915-1919	4	2	5	10	4	2	1	2	407	.....	1	20	1	1,000
Not reported	1	.....	3	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Dakota territory.

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.		Pipe lines, length (miles).	PUMPING PLANTS.			
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).		Number.	Engine capacity (horse-power).	Pumps.	
													Number.	Capacity (gallons per minute).
Total	26	11	32	836	58	58	93	9	1,110	0.3	4	88	10	51,250
Individual and partnership	26	11	30	465	32	33	12	9	1,110	.....	2	28	2	1,250
U. S. Reclamation Service	.....	.....	2	371	26	25	81	.....	.....	0.3	2	60	8	50,000

CROPS.

TABLE 17.—ACREAGE, YIELD, AND VALUE OF CROPS GROWN ON IRRIGATED LAND AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are shown in state bulletin on agriculture.]

	CROP.	AREA HARVESTED.					QUANTITY HARVESTED.					
		1919		1909		Per cent of increase.[1]	Unit.	1919		1909		Per cent of increase.[1]
		Acres.	Per cent of total for state.	Acres.	Per cent of total for state.			Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Oats	2,870	0.1	544	(2)	427.6	Bu.	30,555	0.1	25,655	(2)	19.1
2	Spring wheat	15,713	0.2	1,268	(2)		Bu.	80,292	0.1	28,011	(2)	186.6
3	Barley	1,186	0.1	(3)			Bu.	10,565	0.1	(3)		
4	Rye	2,040	0.1	(3)			Bu.	8,673	0.1	(3)		
	Hay and forage:											
5	Small grains cut for hay	1,664	0.3	(3)			Tons.	906	0.2	(3)		
6	Other tame or cultivated grasses	1,028	0.4	(3)			Tons.	453	0.1	(3)		
7	Wild, salt, or prairie grasses	779	(2)	1,057	(2)	−26.3	Tons.	301	(2)	1,424	0.1	−78.9

	CROP.	AVERAGE YIELD PER ACRE, 1919.						VALUE.				
		Unit.	For state.	On non-irrigated land.	On irrigated land.			1919		1909		Per cent of increase.[1]
					Average.	Per cent of average for state.	Per cent of average on non-irrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Oats	Bu.	14.6	14.6	10.6	72.6	72.6	$24,444	0.1	$8,368		192.1
2	Spring wheat	Bu.	6.8	6.8	5.1	75.0	75.0	192,701	0.1	26,145		637.0
3	Barley	Bu.	11.1	11.1	8.9	80.2	80.2	12,150	0.1	(3)		
4	Rye	Bu.	6.7	6.7	4.3	64.2	64.2	12,576	0.1	(3)		
	Hay and forage:											
5	Small grains cut for hay	Tons.	0.60	0.60	0.54	90.0	90.0	13,137	0.2	(3)		
6	Other tame or cultivated grasses	Tons.	1.23	1.23	0.44	35.8	35.8	7,474	0.1	(3)		
7	Wild, salt, or prairie grasses	Tons.	0.77	0.77	0.39	50.6	50.6	4,666	(2)	9,518	0.1	−51.0

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000. [2] Less than one-tenth of 1 per cent. [3] Not reported separately in 1909.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100, or when per cent is more than 1,000.]

		THE STATE.	McKenzie.	Williams.	All other counties.
1	Number of all farms in 1920	77,690	2,033	2,437	73,220
2	Number of farms irrigated in 1919	340	156	184	.....
3	Per cent of all farms	0.4	7.7	7.6	.....
4	Number of farms irrigated in 1909	69	7	53	9
5	Per cent of increase, 1909-1919	.....	.....	.....	.....
	LAND AND FARM AREA.				
6	Approximate land area—acres	44,917,120	1,522,080	1,368,320	41,726,720
7	All land in farms—acres	36,214,751	1,231,370	987,569	33,995,812
8	Improved land in farms—acres	24,563,178	363,760	508,372	23,691,046
9	Area irrigated in 1919—acres	12,072	6,630	5,442	.....
10	Per cent of improved land in farms	(1)	1.8	1.1	.....
11	Area irrigated in 1909—acres	10,248	850	8,043	1,355
12	Per cent of increase, 1909–1919	17.8	680.0	—32.3	.....
13	Area enterprises were capable of irrigating in 1920—acres	34,235	14,726	19,509	.....
14	Area enterprises were capable of irrigating in 1910—acres	21,917	850	19,664	1,403
15	Per cent of increase, 1910–1920	56.2	.....	—0.8	.....
16	Area included in enterprises in 1920—acres	57,476	21,424	36,052	.....
17	Area included in enterprises in 1910—acres	38,173	1,532	34,865	1,776
18	Per cent of increase, 1910–1920	50.6	.....	3.4	.....
	IRRIGATION WORKS.				
	Independent enterprises:				
19	Number, 1920	30	4	26	.....
20	Number, 1910	49	6	34	9
	Main ditches:				
21	Number, 1920	32	4	28	.....
22	Number, 1910	47	5	35	7
23	Length, 1920—miles	58	26	32	.....
24	Length, 1910—miles	52	8	40	4
25	Capacity, 1920—second-feet	836	276	560	.....
26	Capacity, 1910—second-feet	2,161	162	1,703	296
	Laterals:				
27	Number, 1920	58	.....	58	.....
28	Number, 1910	46	16	30	.....
29	Length, 1920—miles	93	34	59	.....
30	Length, 1910—miles	74	1	73	.....
	Reservoirs:				
31	Number, 1920	9	1	8	.....
32	Number, 1910	22	8	13	1
33	Capacity, 1920—acre-feet	1,110	400	710	.....
34	Capacity, 1910—acre-feet	132,187	25	132,157	5
	Pumped wells:				
35	Number, 1920	.....	.....	.....	.....
36	Number, 1910	1	.....	.....	1
37	Capacity, 1920—gallons per minute	.....	.....	.....	.....
38	Capacity, 1910—gallons per minute	15	.....	.....	15
	Pumping plants:				
39	Number, 1920	4	.....	4	.....
40	Number, 1910	4	1	1	2
41	Engine capacity, 1920—horsepower	88	.....	88	.....
42	Engine capacity, 1910—horsepower	2,038	30	2,000	8
43	Pump capacity, 1920—gallons per minute	51,250	.....	51,250	.....
44	Pump capacity, 1910—gallons per minute	182,115	2,000	180,000	115
45	Average lift, 1920—feet	38	.....	38	.....
	CAPITAL INVESTED.				
46	Capital invested to Jan. 1, 1920—dollars	1,857,118	1,235,209	621,909	.....
47	Capital invested to July 1, 1910—dollars	836,482	6,663	781,100	48,719
48	Per cent of increase, 1910–1920	122.0	.....	—20.4	.....
49	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	54.25	83.88	31.88	.....
50	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	38.17	7.84	39.72	34.72
	ESTIMATED FINAL COST.				
51	Estimated final cost of existing enterprises in 1920—dollars	2,072,766	1,321,457	751,309	.....
52	Estimated final cost of existing enterprises in 1910—dollars	836,482	6,663	781,100	48,719
53	Per cent of increase, 1910–1920	147.8	.....	—3.8	.....
54	Average cost per acre based on estimated final cost and acreage included in enterprises in 1920—dollars	36.06	61.68	20.84	.....
55	Average cost per acre based on estimated final cost and acreage included in enterprises in 1910—dollars	21.91	4.35	22.40	27.43

[1] Less than one-tenth of 1 per cent.

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FOURTEENTH CENSUS OF THE UNITED STATES: 1920

DEPARTMENT OF COMMERCE

BULLETIN

BUREAU OF THE CENSUS

IRRIGATION : OKLAHOMA

STATISTICS FOR THE STATE AND ITS COUNTIES

Prepared under the supervision of WILLIAM LANE AUSTIN, Chief Statistician for Agriculture, by R. P. TEELE, Special Agent In Charge of Irrigation

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INTRODUCTION.

This bulletin presents the statistics of irrigation for the state of Oklahoma collected at the census of 1920. Statistics of acreage irrigated, of acreage and yield of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the bulletin figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage and yield of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

Alfalfa and corn are the only crops for which the area reported as irrigated exceeds 100 acres. The area of irrigated alfalfa reported is 417 acres, with a yield of 615 tons, or 1.47 tons per acre. The average yield for the whole state is 1.96 tons per acre. The area of corn reported as irrigated is 237 acres, with a yield of 4,124 bushels, or 17.4 bushels per acre. The average yield for the state is 21.8 bushels per acre. The remaining irrigated area is divided among other farm crops, gardens, and pastures.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	191,988	190,192	1,796	0.9
Approximate land area of the state.....acres..	44,424,960	44,424,960	.....	.....
All land in farms.....acres..	31,951,934	28,859,353	3,092,581	10.7
Improved land in farms.....acres..	18,125,321	17,551,337	573,984	3.3
Number of farms irrigated	73	137	−64	−46.7
Area irrigated.....acres..	2,969	4,388	−1,419	−32.3
Area enterprises were capable of irrigating.....acres..	9,672	6,397	3,275	51.2
Area included in enterprises.....acres..	11,742	8,528	3,214	37.7
Per cent irrigated:				
Number of all farms	(2)	0.1	−0.1	.....
Approximate land area of state	(2)	(2)	.....	.....
Land in farms	(2)	(2)	.....	.....
Improved land in farms	(2)	(2)	.....	.....
Excess of area enterprises were capable of irrigating over area irrigated.....acres..	6,703	2,009	4,694	233.6
Excess of area included in enterprises over area irrigated.....acres..	8,773	4,140	4,633	111.9
Capital invested	$151,325	$47,200	$104,125	220.6
Average per acre enterprises were capable of irrigating	$15.65	$7.38	$8.27	112.1
Estimated final cost of existing enterprises	$162,775	$47,200	$115,575	244.9
Average per acre included in enterprises	$13.86	$5.53	$8.33	150.6
Average cost of operation and maintenance per acre	$2.92	$0.51	$2.41	472.5

[1] A minus sign (—) denotes decrease.

[2] Less than one-tenth of 1 per cent.

EXPLANATION OF TERMS.

Farms irrigated.—The number of "farms irrigated" is the number on which irrigation is practiced, and for the purposes of this inquiry a "farm" is defined as for the general census of agriculture; that is, to be classed as a farm an establishment either must be 3 acres in extent or must have produced crops to the value of $250 in 1919, or must have required for its agricultural operations the continuous services of at least one person. "Number of farms irrigated" as used in this report and in that of 1910, is equivalent to the term "number of irrigators" used in census reports on irrigation previous to 1910.

Irrigation enterprise.—An "enterprise" is an independent irrigation establishment and includes the works for supplying water and the land to which water is supplied or is to be supplied, except that the cost or value of the land is not included in the "capital invested."

Acreage irrigated, in enterprises, and available for settlement.—Acreage irrigated is the acreage to which water was actually applied in the season preceding the census year—1919 for the Fourteenth Census and 1909 for the Thirteenth Census.

Acreage to which enterprises were capable of supplying water relates to the season following the time of taking the census and, consequently, is based on estimates made by those controlling the enterprises.

Acreage included in enterprises represents the extent of the plans of those controlling enterprises.

Acreage of irrigated land reported as available for settlement relates to land within existing enterprises and not to land that is susceptible of reclamation and settlement by new enterprises or extensions of existing enterprises.

Types of enterprises.—The types of enterprises under which all data are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands. In addition to serving land within its own projects, the United States Reclamation Service supplies stored water to land within other enterprises.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who may own no interest in the works.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization.

Capital invested.—The capital invested in irrigation enterprises is that reported by the owners. For the larger works the capital invested is taken, in most cases, from books of account and represents the actual investment. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the capital reported represents the owners' estimates. The schedules used in 1910 called for "cost," while the schedule used in the present census calls for "capital invested," but the instructions accompanying the schedules make these two terms equivalent. In both cases the investment includes cost of construction and of acquiring rights. The latter usually consists of filing fees only, but in some instances it includes the purchase price of rights. However, these cases are so rare that they are unimportant. The cost reported for 1900 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. For the Thirteenth and Fourteenth Censuses the average cost per acre is based on the acreage which enterprises were capable of irrigating in the census year and the cost to the date of the census—January 1, 1920, for the Fourteenth Census, and July 1, 1910, for the Thirteenth Census.

Operation and maintenance.—Cost of operation and maintenance was not reported on all schedules, and averages are based on the acreages for which cost is reported. No estimate of total cost of operation and maintenance for all irrigation enterprises has been made. In the case of enterprises operating pumping plants the cost of operation and maintenance includes cost of fuel and attendance.

Water rights.—The acreage irrigated has been classified by the character of rights under which water is received. The classes used are defined as follows:

"*Appropriation and use*" includes all rights acquired without formalities of any kind that have not been defined by the courts.

"*Notice filed and posted*" includes rights for which claims of some kind have been either posted or filed that have not been defined by the courts.

"*Adjudicated by court*" includes all rights that have been defined by the courts.

"*Permit from state*" includes all rights initiated under laws requiring any party wishing to acquire rights to obtain a permit from the state.

"*Certificate or license from the state*" includes rights acquired under laws providing for the issuing by the state of certificates or licenses defining rights acquired.

"*Riparian rights*" includes rights based on the ownership of riparian land.

"*Underground*" represents water taken from wells.

Source of water supply.—In classifying acreage by source of supply from which water for irrigation is obtained, in 1910 acreage was credited to what seemed to be the principal source of supply, while in the census of 1920 the attempt is made to represent the facts more nearly by presenting various mixed classes.

Date of beginning.—The date of beginning of irrigation enterprises is, in some cases, the date when construction began, and, in other cases, the date of filing a claim or of applying for a permit. If a filing or application for permit was made and work was begun and continued with reasonable diligence the date of filing is considered the date of beginning, otherwise the date of construction is taken as the date of beginning.

Drainage basin.—The drainage basin of a stream is all of the land drained by the stream and its tributaries.

Units of quantity and capacity.—Capacities of canals, reservoirs, wells, pumps, and engines, and quantities of water used are expressed in the units commonly used in engineering literature to express the same items. They are as follows:

Capacities of canals and volumes of flowing water are given in second-feet, a shorter equivalent for cubic feet per second.

Capacities of wells and pumps are given in gallons per minute. Four hundred and fifty gallons per minute equal 1 second-foot.

Capacities of reservoirs are given in acre-feet. An acre-foot is the quantity of water that will cover 1 acre to a depth of 1 foot. It equals 43,560 cubic feet.

Capacities of engines and motors are given in horsepower. One horsepower is the power required to lift 33,000 pounds through a vertical distance of 1 foot in 1 minute of time.

CLIMATIC CONDITIONS.

The larger part of the state of Oklahoma receives sufficient rainfall to obviate the necessity for irrigation, the normal annual precipitation for the state being about 34 inches, and of this about three-fourths occurs during the growing season. In the extreme northwestern part of the state the normal annual precipitation is about 20 inches, but a large part of the rainfall in late summer in this section as well as in the rest of the state, comes in local showers, and crops sometimes suffer for moisture.

In the western part of the state the spring and summer precipitation in 1919 was far above normal, and there was little or no need of irrigation.

WATER SUPPLY FOR IRRIGATION.

Most of western Oklahoma is well watered. It is drained by the Salt Fork of the Arkansas, the Cimarron, the North Canadian, the South Canadian, the Washita, and the Red Rivers and their tributaries. As a rule these streams do not carry large volumes of water. They are subject to sudden rises coming from heavy local rains, but the floods are seldom of long duration. Without the storing of flood waters these streams are not reliable sources of water for irrigation.

No doubt ground water can be obtained from wells in the stream valleys, but the demand for water for irrigation has not been sufficient to bring about either the storing of flood water or the sinking of wells.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1900 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.[1]	Per cent of all farms.	Acres.	Per cent of increase.[1]	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	73	−46.7	(2)	2,969	−32.3	(2)	(2)	(2)
1910	137	10.5	0.1	4,388	59.0	(2)	(2)	(2)
1900	124	.....	0.1	2,759	.....	(2)	(2)	(2)

[1] A minus sign (−) denotes decrease. [2] Less than one-tenth of 1 per cent.

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of acreage in enterprises.	
Total	33	11,742	2,969	25.3	9,672
1890–1899	5	8,812	2,392	27.1	8,112
1900–1904	3	159	108	67.9	159
1905–1909	2	150	55	36.7	150
1910–1914	12	1,983	298	15.0	633
1915–1919	9	398	36	9.0	378
Not reported	2	240	80	33.3	240

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1] Amount.	Per cent.		
Total	2,969	4,388	−1,419	−32.3	9,672	11,742
Stream, gravity	2,522	4,205	−1,683	−40.0	8,972	11,022
Stream, pumped	188	50	138	.....	355	355
Wells, pumped	107	69	38	.....	118	138
Wells, flowing	18	.....	18	.....	18	18
Lake, gravity	.....	28	−28	.....	.....	.....
Springs	6	16	−10	.....	6	6
Stored storm water	.....	20	−20	.....	.....	.....
City water	3	(2)	3	.....	3	3
Mixed	125	(2)	125	.....	200	200

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.

[2] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF ENTERPRISE.

The constitution of the state of Oklahoma, adopted in 1907, contains the following section relating to organization for land reclamation:

"The legislature shall have the power and shall provide for a system of levees, drains, and ditches and of irrigation in this state when deemed expedient, and provide for a system of taxation on the lands affected or benefited by such levees, drains, and ditches and irrigation, or on crops produced on such land, to discharge such bonded indebtedness or expense necessarily incurred in the establishment of such improvements; and to provide for compulsory issuance of bonds by the owners or lessees of the lands benefited by such levees, drains and ditches, or irrigation." Art. XVI, sec. 3.

In 1915 the legislature enacted an irrigation district law under this section of the constitution, but no districts are reported.

The state has never accepted the conditions of the Federal Carey Act (act of Aug. 18, 1894).

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Acres.	Per cent.
ACREAGE IRRIGATED.				
Total	2,969	4,388	−1,419	−32.3
Individual	969	2,388	−1,419	−59.4
Cooperative	2,000	2,000	.....	.....
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	9,672	6,397	3,275	51.2
Individual	2,072	3,397	−1,325	−39.0
Cooperative	7,600	3,000	4,600	153.3
ACREAGE INCLUDED IN ENTERPRISES.				
Total	11,742	8,528	3,214	37.7
Individual	4,142	5,028	−886	−17.6
Cooperative	7,600	3,500	4,100	117.1

[1] A minus sign (−) denotes decrease.

An act passed in 1897 provided for the organization of corporations to build irrigation works and authorized such corporations to enter into contracts for the sale of water rights, having these secured by liens on the lands covered, or to lease water and have the rentals secured by liens on the crops grown, or otherwise. No such commercial companies are reported.

The United States Reclamation Service has investigated proposed enterprises in Oklahoma, but has not undertaken any of them.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of Oklahoma relating to water rights are summarized in the following paragraphs:

The territory of Oklahoma was organized in 1890, and in 1897 the territorial legislature enacted its first law relating to water rights. This law contained the following section:

"The unappropriated waters of the ordinary flow or underflow of every running stream or flowing river, and the storm or rain water of every river or natural stream, canon, ravine, depression, or watershed within those portions of the state of Oklahoma in which by reason of the insufficient rainfall, or by reason of the irregularity of the rainfall, irrigation is beneficial for agricultural purposes, are hereby declared to be the property of the public, and may be acquired by appropriation for the uses and purposes and in the manner as hereinafter provided."

This law contained the following proviso recognizing riparian rights, "Provided, that such flow or underflow of water shall not be diverted to the prejudice of the rights of the riparian owner without his consent, except after condemnation thereof in the manner as hereinafter provided."

This law provided for the filing of claims for new enterprises with county recorders of deeds, and required also the filing of claims for previously existing rights.

In 1905, the territory created the office of territorial engineer and provided that parties wishing to acquire rights to water should apply to the engineer for permits. The law provided for the submitting of proof of completion of works and the issuing of certificates of completion and for the submitting of proof of having put the water appropriated to a beneficial use and the issuing of licenses to divert the quantities of water to which rights had been acquired.

The state engineer is directed to make surveys and collect the information necessary for defining rights to water and to transmit the results to the attorney general of the state, who is directed to bring suits on behalf of the state for the adjudication of rights. The attorney general is directed also to intervene in suits brought by other parties, while the courts are directed to call on the state engineer for information when suits involving water rights are brought.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.
	Acres.	Per cent of total.	
Total	2,969	100.0	100.0
Appropriation and use	35	1.2	77.4
Notice filed and posted	215	7.2	5.4
Adjudicated by court	2,200	74.1	17.1
Permit from state	310	10.4	.....
Riparian rights	80	2.7	.....
Underground	120	4.0	(1)
Other and mixed	3	0.1	(1)
Not reported	6	0.2	(1)

[1] This class was not included in the tabulation for 1909. All land for which the class of water rights was not reported was included in "Appropriation and use."

ACREAGE, BY DRAINAGE BASIN.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Total	2,969	[2] 3,328	−10.8	11,742	9,672
Arkansas River and tributaries	2,843	[2] 3,207	−11.4	11,449	9,379
Canadian River	251	869	−71.1	502	495
Cimarron River	2,588	1,963	31.8	10,929	8,879
Other tributaries of Arkansas River	4	220	−98.2	18	5
Red River and tributaries	126	121	4.1	293	293

[1] A minus sign (−) denotes decrease.
[2] Includes 155 acres irrigated by springs but not shown by drainage basins.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1900 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.[1]
1920	$151,325	220.6	$15.65	112.1
1910	47,200	115.8	7.38	−6.9
1900	21,872	.....	7.93	.....

[1] A minus sign (−) denotes decrease.

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$151,325	100.0	$15.65
1890–1899	54,378	35.9	6.70
1900–1904	3,403	2.2	21.40
1905–1909	4,085	2.7	27.23
1910–1914	67,101	44.3	106.00
1915–1919	17,009	11.2	45.00
Not reported	5,349	3.5	22.29

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$151,325	100.0	$15.65	2,626	$2.92
Stream, gravity	90,040	59.5	10.04	2,322	1.56
Stream, pumped	4,210	2.8	11.86	123	3.74
Wells, pumped	47,075	31.1	398.94	32	40.78
Wells, flowing	5,000	3.3	277.78	18	55.56
Springs	1,000	0.7	166.67	6	4.17
City water	1,500	1.0	500.00	.....	.....
Mixed	2,500	1.7	12.50	125	10.00

[1] Based on area irrigated in 1919.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.	
			Amount.	Per cent.
Total	$151,325	[1] $36,770	$114,555	311.5
Arkansas River and tributaries	142,597	[1] 35,802	106,795	298.3
Canadian River	46,234	6,918	39,316	568.3
Cimarron River	93,157	15,977	77,180	483.1
Other tributaries of Arkansas River	3,206	1,582	1,624	102.7
Red River and tributaries	8,728	968	7,760	801.7

[1] Includes $11,325 invested in springs and wells but not shown by drainage basins.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$151,325	100.0	2,626	$2.92
Individual	110,658	73.1	626	8.73
Cooperative	40,667	26.9	2,000	1.10

[1] Based on area irrigated in 1919.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

[No land is reported as having had drains installed.]

Number of enterprises reporting land needing drainage	3
Acreage included in enterprises reporting land needing drainage	1,960
Acreage needing drainage	1,820
Per cent that acreage needing drainage is of total acreage in irrigation enterprises in the state	15.5

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only one irrigation schedule, and in this instance the water was not measured. The average volume entering the canal was reported as 2 second-feet, and the area irrigated was 125 acres, making an average of 62.5 acres per second-foot.

IRRIGATION WORKS.

TABLE 14.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	7	3	18	344	38	72	19	8	52
1890–1899	3		5	182	25	28	17		
1900–1904	1	1	3	31	2	34		2	
1905–1909	1		2	7	1	8	1		
1910–1914	1	1	5	70	7	2	1	3	2
1915–1919	1		2	54	3			1	
Not reported		1	1					2	50

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	4.3	1	100	19	3,643	22	184	26	7,668
1900–1904				1	35	1		1	35
1905–1909						1	12	1	750
1910–1914	1.8	1	100	11	2,980	12	121	15	5,265
1915–1919	2.4			7	628	7	39	8	1,618
Not reported	0.1					1	12	1	

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	7	3	18	344	38	72	19	8	52
Individual	6	3	17	194	22	49	3	8	52
Cooperative	1	.....	1	150	16	23	16	.....	.....

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	4.3	1	100	19	3,643	22	184	26	7,668
Individual	4.3	1	100	19	3,643	22	184	26	7,668

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	7	3	18	344	38	72	19	8	52
Arkansas River and tributaries	7	2	14	290	38	70	18	7	52
Canadian River	.....	2	5	8	3	9	1	6	52
Cimarron River	7	.....	9	282	35	61	17	1	.....
Other tributaries of Arkansas River	.....	.....	.....	.....	.....	.....	.....	.....	.....
Red River and tributaries	.....	1	4	54	.....	2	1	1	.....

DRAINAGE BASIN.	Pipe lines length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	4.3	1	100	19	3,643	22	184	26	7,668	59
Arkansas River and tributaries	4.3	.....	.....	19	3,643	18	120	22	4,668	69
Canadian River	4.0	.....	.....	12	1,106	12	78	16	3,141	89
Cimarron River	.....	.....	.....	5	2,485	4	33	4	1,485	26
Other tributaries of Arkansas River	0.3	.....	.....	2	52	2	9	2	42	19
Red River and tributaries	.....	1	100	.....	.....	4	64	4	3,000	30

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		THE STATE.	Beaver.	Cimarron.	All other counties.
1	Number of all farms in 1920	191,988	2,518	767	188,703
2	Number of farms irrigated in 1919	73	15	17	41
3	Per cent of all farms	(1)	0.6	2.2	(1)
4	Number of farms irrigated in 1909	137	11	32	94
5	Per cent of increase, 1909–1919	−46.7			
	LAND AND FARM AREA.				
6	Approximate land area—acres	44,424,960	1,160,320	1,183,360	42,081,280
7	All land in farms—acres	31,951,934	1,099,058	809,024	30,043,852
8	Improved land in farms—acres	18,125,321	508,103	97,177	17,520,041
9	Area irrigated in 1919—acres	2,969	2,008	315	646
10	Per cent of improved land in farms	(1)	0.4	0.3	(1)
11	Area irrigated in 1909—acres	4,388	138	708	3,542
12	Per cent of increase, 1909–1919	−32.3		−55.5	−81.8
13	Area enterprises were capable of irrigating in 1920—acres	9,672	7,609	905	1,158
14	Area enterprises were capable of irrigating in 1910—acres	6,397	259	995	5,143
15	Per cent of increase, 1910–1920	51.2		−9.0	−77.5
16	Area included in enterprises in 1920—acres	11,742	7,609	2,255	1,878
17	Area included in enterprises in 1910—acres	8,528	353	1,165	7,010
18	Per cent of increase, 1910–1920	37.7		93.6	−73.2
	IRRIGATION WORKS.				
	Independent enterprises:				
19	Number, 1920	33	3	6	24
20	Number, 1910	114	11	32	71
	Main ditches:				
21	Number, 1920	18	3	5	10
22	Number, 1910	47	2	16	29
23	Length, 1920—miles	38	17	14	7
24	Length, 1910—miles	54	3	10	41
25	Capacity, 1920—second-feet	344	150	123	71
26	Capacity, 1910—second-feet	155	2	42	111
	Laterals:				
27	Number, 1920	72	53	8	11
28	Number, 1910	103	13	59	34
29	Length, 1920—miles	19	16	1	2
30	Length, 1910—miles	31	3	13	15
	Reservoirs:				
31	Number, 1920	8	1		7
32	Number, 1910	11	5		6
33	Capacity, 1920—acre-feet	52			52
34	Capacity, 1910—acre-feet	22	10		12
	Flowing wells:				
35	Number, 1920	1			1
36	Number, 1910—gallons per minute	100			100
37	Capacity, 1920—gallons per minute				
38	Capacity, 1910				
	Pumped wells:				
39	Number, 1920	19	1	1	17
40	Number, 1910	65	7	17	41
41	Capacity, 1920—gallons per minute	3,643	35	1,600	2,008
42	Capacity, 1910—gallons per minute	1,791	199	400	1,192
	Pumping plants:				
43	Number, 1920	22	1	1	20
44	Number, 1910	68	7	18	43
45	Engine capacity, 1920—horsepower	184		8	176
46	Engine capacity, 1910—horsepower	107	7	32	68
47	Pump capacity, 1920—gallons per minute	7,668	35	600	7,033
48	Pump capacity, 1910—gallons per minute	4,541	199	1,240	3,102
49	Average lift, 1920—feet	59		16	62
	CAPITAL INVESTED.				
50	Capital invested to Jan. 1, 1920—dollars	151,325	41,360	33,680	76,285
51	Capital invested to July 1, 1910—dollars	47,200	3,699	8,360	35,141
52	Per cent of increase, 1910–1920	220.6		302.9	117.1
53	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	15.65	5.44	37.22	65.88
54	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	7.38	14.28	8.40	6.83
	ESTIMATED FINAL COST.				
55	Estimated final cost of existing enterprises in 1920—dollars	162,775	41,360	42,680	78,735
56	Estimated final cost of existing enterprises in 1910—dollars	47,200	3,699	8,360	35,141
57	Per cent of increase, 1910–1920	244.9		410.5	124.1
58	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	13.86	5.44	18.93	41.92
59	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	5.53	10.48	7.18	5.01

(1) Less than one-tenth of 1 per cent.

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FOURTEENTH CENSUS OF THE UNITED STATES: 1920

DEPARTMENT OF COMMERCE

BULLETIN

BUREAU OF THE CENSUS

IRRIGATION : OREGON

STATISTICS FOR THE STATE AND ITS COUNTIES

Prepared under the supervision of WILLIAM LANE AUSTIN, Chief Statistician for Agriculture, by R. P. TEELE, Special Agent in Charge of Irrigation

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INTRODUCTION.

This bulletin presents the statistics of irrigation for the state of Oregon collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the bulletin figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

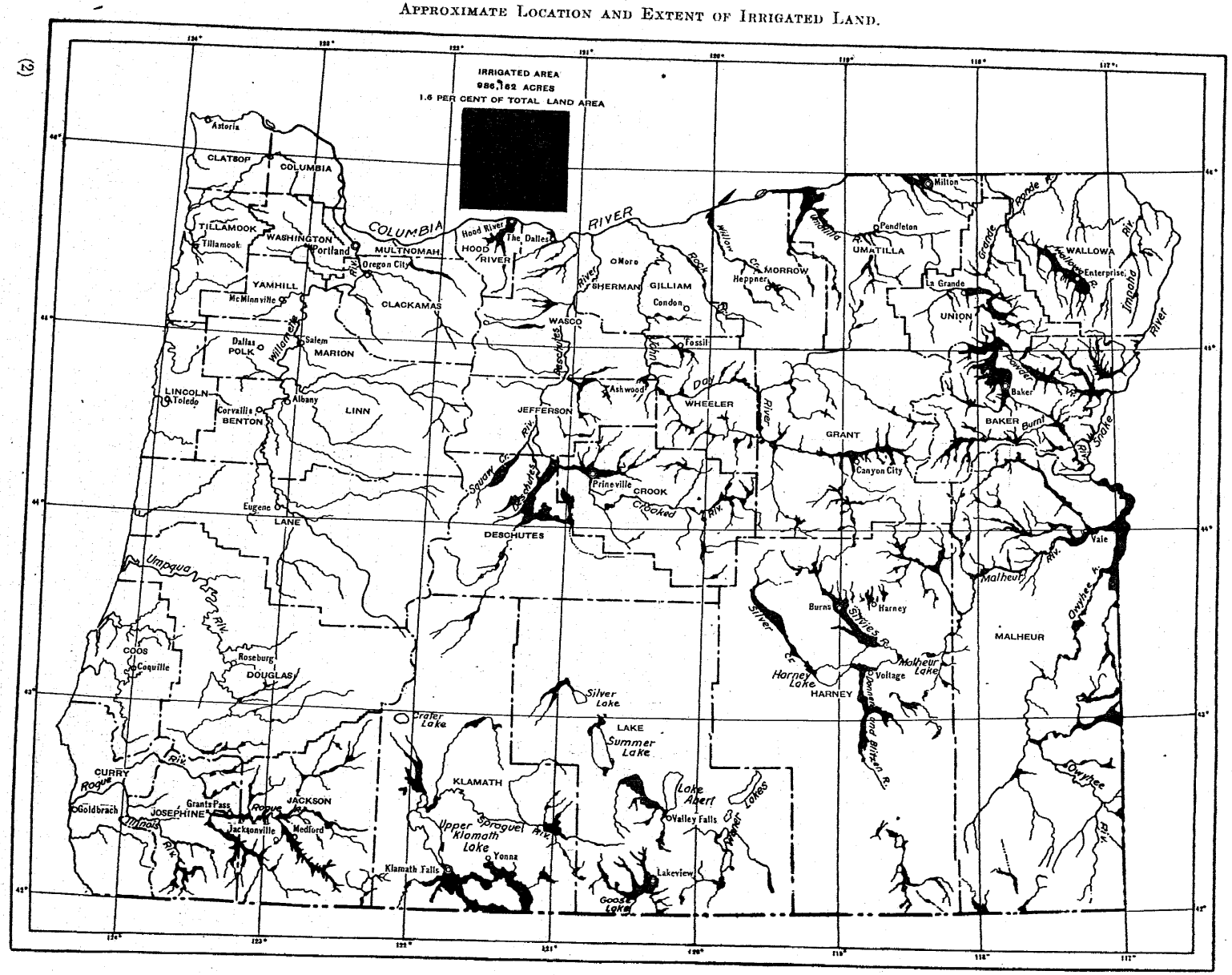
ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	50,206	45,502	4,704	10.3
Approximate land area of the state.....acres	61,188,480	61,188,480	.....	.....
All land in farms.....acres	13,542,318	11,685,110	1,857,208	15.9
Improved land in farms.....acres	4,913,851	4,274,803	639,048	14.9
Number of farms irrigated	9,154	6,669	2,485	37.3
Area irrigated.....acres	986,162	686,129	300,033	43.7
Area enterprises were capable of irrigating.....acres	1,344,046	830,526	513,520	61.8
Area included in enterprises.....acres	1,925,987	2,527,208	−601,221	−23.8
Per cent irrigated:				
Number of all farms	18.2	14.7	3.5	.....
Approximate land area of state	1.6	1.1	0.5	.....
Land in farms	7.3	5.9	1.4	.....
Improved land in farms	20.1	16.1	4.0	.....
Excess of area enterprises were capable of irrigating over area irrigated.....acres	357,884	144,397	213,487	147.8
Excess of area included in enterprises over area irrigated.....acres	939,825	1,841,079	−901,254	−49.0
Area of irrigated land reported as available for settlement.....acres	98,609	(2)	98,609	.....
Capital invested	$28,929,151	$12,760,214	$16,168,937	126.7
Average per acre enterprises were capable of irrigating	$21.52	$15.36	$6.16	40.1
Estimated final cost of existing enterprises	$41,585,742	$39,216,619	$2,369,123	6.0
Average per acre included in enterprises	$21.59	$15.52	$6.07	39.1
Average cost of operation and maintenance per acre	$1.19	$0.75	$0.44	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.

[2] Not reported in 1910.

OREGON

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.



EXPLANATION OF TERMS.

Farms irrigated.—The number of "farms irrigated" is the number on which irrigation is practiced, and for the purposes of this inquiry a "farm" is defined as for the general census of agriculture; that is, to be classed as a farm an establishment either must be 3 acres in extent or must have produced crops to the value of $250 in 1919, or must have required for its agricultural operations the continuous services of at least one person. "Number of farms irrigated" as used in this report and in that of 1910, is equivalent to the term "number of irrigators" used in census reports on irrigation previous to 1910.

Irrigation enterprise.—An "enterprise" is an independent irrigation establishment and includes the works for supplying water and the land to which water is supplied or is to be supplied, except that the cost or value of the land is not included in the "capital invested."

Acreage irrigated, in enterprises, and available for settlement.—Acreage irrigated is the acreage to which water was actually applied in the season preceding the census year—1919 for the Fourteenth Census and 1909 for the Thirteenth Census.

Acreage to which enterprises were capable of supplying water relates to the season following the time of taking the census and, consequently, is based on estimates made by those controlling the enterprises.

Acreage included in enterprises represents the extent of the plans of those controlling enterprises.

Acreage of irrigated land reported as available for settlement relates to land within existing enterprises and not to land that is susceptible of reclamation and settlement by new enterprises or extensions of existing enterprises.

Types of enterprises.—The types of enterprises under which all data are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands. In addition to serving land within its own projects, the United States Reclamation Service supplies stored water to land within other enterprises.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who may own no interest in the works.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization.

Capital invested.—The capital invested in irrigation enterprises is that reported by the owners. For the larger works the capital invested is taken, in most cases, from books of account and represents the actual investment. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the capital reported represents the owners' estimates. The schedules used in 1910 called for "cost," while the schedule used in the present census calls for "capital invested," but the instructions accompanying the schedules make these two terms equivalent. In both cases the investment includes cost of construction and of acquiring rights. The latter usually consists of filing fees only, but in some instances it includes the purchase price of rights. However, these cases are so rare that they are unimportant. The cost reported for 1900 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. For the Thirteenth and Fourteenth Censuses the average cost per acre is based on the acreage which enterprises were capable of irrigating in the census year and the cost to the date of the census—January 1, 1920, for the Fourteenth Census, and July 1, 1910, for the Thirteenth Census.

Operation and maintenance.—Cost of operation and maintenance was not reported on all schedules, and averages are based on the acreages for which cost is reported. No estimate of total cost of operation and maintenance for all irrigation enterprises has been made. In the case of enterprises operating pumping plants the cost of operation and maintenance includes cost of fuel and attendance.

Water rights.—The acreage irrigated has been classified by the character of rights under which water is received. The classes used are defined as follows:

"*Appropriation and use*" includes all rights acquired without formalities of any kind that have not been defined by the courts.

"*Notice filed and posted*" includes rights for which claims of some kind have been either posted or filed that have not been defined by the courts.

"*Adjudicated by court*" includes all rights that have been defined by the courts.

"*Permit from state*" includes all rights initiated under laws requiring any party wishing to acquire rights to obtain a permit from the state.

"*Certificate or license from the state*" includes rights acquired under laws providing for the issuing by the state of certificates or licenses defining rights acquired.

"*Riparian rights*" includes rights based on the ownership of riparian land.

"*Underground*" represents water taken from wells.

Source of water supply.—In classifying acreage by source of supply from which water for irrigation is obtained, in 1910 acreage was credited to what seemed to be the principal source of supply, while in the census of 1920 the attempt is made to represent the facts more nearly by presenting various mixed classes.

Date of beginning.—The date of beginning of irrigation enterprises is, in some cases, the date when construction began, and, in other cases, the date of filing a claim or of applying for a permit. If a filing or application for permit was made and work was begun and continued with reasonable diligence the date of filing is considered the date of beginning, otherwise the date of construction is taken as the date of beginning.

Drainage basin.—The drainage basin of a stream is all of the land drained by the stream and its tributaries.

Units of quantity and capacity.—Capacities of canals, reservoirs, wells, pumps, and engines, and quantities of water used are expressed in the units commonly used in engineering literature to express the same items. They are as follows:

Capacities of canals and volumes of flowing water are given in second-feet, a shorter equivalent for cubic feet per second.

Capacities of wells and pumps are given in gallons per minute. Four hundred and fifty gallons per minute equal 1 second-foot.

Capacities of reservoirs are given in acre-feet. An acre-foot is the quantity of water that will cover 1 acre to a depth of 1 foot. It equals 43,560 cubic feet.

Capacities of engines and motors are given in horsepower. One horsepower is the power required to lift 33,000 pounds through a vertical distance of 1 foot in 1 minute of time.

CLIMATIC CONDITIONS.

The climatic conditions determining the necessity for irrigation are the amount and seasonal distribution of precipitation, principally rainfall. From the standpoint of amount of precipitation Oregon is divided into two distinct portions by the Cascade Mountains.

The portion of the state west of the Cascades receives the heaviest rainfall of any part of the United States, while east of the Cascades the rainfall is so small that this part of the state is mostly arid. West of the mountains, however, there is a fairly distinct dry season, only 10 per cent of the annual precipitation occurring in June, July, August, and September. This makes irrigation necessary to the maturing of crops whose growing season extends into the late summer, and makes it desirable for pastures at this season.

The chief characteristics of the climate of the part of the state east of the Cascades are a scanty rainfall, low humidity, rapid evaporation, and an abundance of sunshine. The annual precipitation ranges from 8 to 25 inches. At the summit of the Cascades the annual precipitation exceeds 40 inches; it decreases to the eastward, and reaches 15 inches about the center of the state. East of this there is a section receiving less than 15 inches, extending in a narrow strip to the north line of the state, but expanding to the southward, and occupying the whole southeast third of the state. In the Blue Mountains, in the northeastern part of the state, the precipitation increases to about 25 inches.

The precipitation is heaviest in the winter, but there is a secondary maximum in May and June, with a very dry period during the late summer. The relatively large winter and spring precipitation makes it possible to raise grain crops without irrigation in most sections in normal years, but irrigation is necessary for the growing of other crops except in some of the higher valleys.

The snowfall in the Cascades is very heavy, and snow remains on some of the higher peaks throughout the year.

For the state as a whole, precipitation in 1919 was slightly above the normal. There was a large excess in the western section and a slight deficiency in the eastern section. While the deficiency for the year was small, there was a marked drouth in spring and summer throughout the state, May and June recording the lowest amounts ever recorded for those months, and July having the lowest precipitation on record with two exceptions. In the eastern division of the state the precipitation from May to August, inclusive, was only 0.84 inch, which is but 26 per cent of the normal. As a consequence of this drouth both irrigated and nonirrigated crops suffered.

WATER SUPPLY FOR IRRIGATION.

West of the Cascade Mountains the heavy precipitation and the large flow of the streams provide an ample supply of water for the small amount of irrigation practiced during the summer dry season. Only small areas are irrigated in this part of the state.

Deschutes River and its tributaries drain the eastern slope of the Cascade Mountains in Oregon, and a considerable area of the high plains to the east of the mountains. Because of the character of its drainage area this river has a remarkably uniform flow, and, consequently, it is a valuable source of water for irrigation. Throughout its lower course it flows in a deep canyon and is not used for irrigation. In the central part of its course there are several large enterprises in the course of development.

John Day River rises in the Blue Mountains and flows west and north to the Columbia. The river and its tributaries are used for irrigation in the valleys near the headwaters, but for the last 100 miles of its course the river flows in a deep canyon and is not used for irrigation.

Umatilla River also rises in the Blue Mountains and flows in a northwesterly direction to the Columbia. There are large level areas along its lower course near the Columbia, and works have been built to utilize its waters.

Grande Ronde River, also, rises in the Blue Mountains. It flows to the northeast into Snake River. Near its source it flows through Grande Ronde Valley, where there is a large area of agricultural land.

Powder and Burnt Rivers rise in these same mountains and flow to the southeast into Snake River, supplying water to considerable areas.

Malheur River rises in the southern part of the Blue Mountains and flows in an easterly direction to Snake River. Its waters are used for irrigation.

Owyhee River rises in northern Nevada, flows through the southwest corner of Idaho, and then in a northerly direction in Oregon to Snake River. Its waters are used for irrigation in all three of the states through which it flows.

In south central Oregon there are many streams rising in the hills and flowing into lakes or sinks which have no outlets. The larger streams are Silvies River and Donner and Blitzen River. Those flow into Malheur Lake, one from the north and the other from the south. Both are used for irrigation. There are many small streams of a similar character.

West of this Great Basin drainage is the drainage basin of Klamath River. There are large projects on this stream in the vicinity of Klamath Lake.

Taking the state as a whole, there are still large opportunities for irrigation development, since there are immense areas of tillable land, and large unused supplies of water.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	9,154	37.3	18.2	986,162	43.7	1.6	7.3	20.1
1910	6,669	43.9	14.7	686,129	76.7	1.1	5.9	16.1
1900	4,636	47.2	12.9	388,310	118.2	0.6	3.9	11.7
1890	3,150	.....	12.3	177,944	.....	0.4	2.6	5.1

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of acreage in enterprises.	
Total	4,710	1,925,987	986,162	51.2	1,344,046
Before 1860	64	10,528	8,206	77.9	9,409
1860-1869	211	56,754	46,917	82.7	51,216
1870-1879	433	130,199	90,950	69.9	101,727
1880-1889	889	276,789	198,653	71.8	248,957
1890-1899	732	181,282	123,043	67.9	143,186
1900-1904	461	237,259	123,648	52.1	172,549
1905-1909	390	434,996	142,756	32.8	237,680
1910-1914	513	257,831	91,425	35.5	111,068
1915-1919	478	214,025	62,458	29.2	151,145
Not reported	539	126,324	98,106	77.7	117,109

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Acres.	Per cent.		
Total	986,162	686,129	300,033	43.7	1,344,046	1,925,987
Stream, gravity	786,354	643,281	143,073	22.2	1,070,244	1,423,039
Stream, pumped	64,576	3,585	60,991	.....	81,138	96,562
Stream, pumped and gravity	253	(2)	253	.....	263	293
Wells, pumped	1,993	805	1,188	147.6	2,418	2,723
Wells, flowing	72	655	−583	−89.0	146	436
Wells, flowing and pumped	340	(2)	340	.....	340	340
Lake, pumped	1,620	821	799	97.3	1,787	1,875
Lake, gravity	5,750	22,915	−17,165	−74.9	31,779	31,779
Springs	9,584	10,788	−1,204	−11.2	10,610	13,813
Stored storm water	3,763	3,279	484	14.8	5,522	9,635
City water	258	(2)	258	.....	264	264
Sewage	10	(2)	10	.....	10	10
Stream, gravity, and pumped wells	105	(2)	105	.....	105	130
Stream, gravity, and flowing wells	200	(2)	200	.....	200	450
Other mixed	111,137	(2)	111,137	.....	139,073	344,475
Other and not reported	147	(2)	147	.....	147	163

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF ENTERPRISE.

Oregon enacted its original irrigation district law in 1895, and this act, as amended from time to time, is still in force.

The conditions of the Federal Carey Act (act of Congress, Aug. 18, 1894) were accepted by Oregon in 1901, and several large projects were begun under this act. These were not successful and in 1913 the state took over one of these projects and is completing it. This is reported under Carey Act in Table 5. The small area credited to the state belongs to a state institution, and does not represent a scheme of state construction.

The land in the Klamath project of the United States Reclamation Service has been organized into an irrigation district, but the acreage is credited to the Reclamation Service because the Government constructed the works and still controls them to a large extent. The Reclamation Service also supplies some water under special contract to lands included in another irrigation district and, to that extent, the acreage credited to the Reclamation Service in Table 5 does not represent the entire acreage receiving water from its works.

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
ACREAGE IRRIGATED.				
Total	986,162	686,129	300,033	43.7
Individual and partnership	590,626	410,078	180,548	44.0
Cooperative	186,037	149,985	36,052	24.0
Irrigation district	92,081	1,500	90,581	.....
Carey Act	30,665	24,750	5,915	23.9
Commercial	27,338	77,387	−50,049	−64.7
U. S. Reclamation Service	54,981	22,000	32,981	149.9
U. S. Indian Service	4,000	429	3,571	832.4
State	.....	.....	.....	.....
City	330	(2)	330	.....
Other	104	(2)	104	.....
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	1,344,046	830,526	513,520	61.8
Individual and partnership	689,723	454,074	235,649	51.9
Cooperative	236,171	169,944	66,227	39.0
Irrigation district	198,540	1,500	197,040	.....
Carey Act	67,580	65,500	2,080	3.2
Commercial	67,163	93,750	−26,587	−28.4
U. S. Reclamation Service	76,525	45,319	31,206	68.9
U. S. Indian Service	7,600	439	7,161	.....
State	300	(2)	300	.....
City	340	(2)	340	.....
Other	104	(2)	104	.....
ACREAGE INCLUDED IN ENTERPRISES.				
Total	1,925,987	2,527,208	−601,221	−23.8
Individual and partnership	828,471	619,986	208,485	33.6
Cooperative	329,241	399,632	−70,391	−17.6
Irrigation district	271,172	5,980	265,192	.....
Carey Act	164,970	623,264	−458,294	−73.5
Commercial	150,289	692,467	−542,178	−78.3
U. S. Reclamation Service	171,444	185,000	−13,556	−7.3
U. S. Indian Service	9,600	879	8,721	992.2
State	300	(2)	300	.....
City	390	(2)	390	.....
Other	110	(2)	110	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of Oregon relating to water rights are summarized in the following paragraphs:

Although Oregon was admitted to the Union in 1859, there was no legislation relating to water rights until 1891, when a law relating principally to the rights of corporations organized to supply water for hire was enacted. This law contained the following general declaration regarding water rights:

"All existing appropriations of water made for beneficial purposes, by any person, corporation, or company, in accordance with the laws of the United States, or in accordance with the laws of the state of Oregon, or the decisions of its supreme court, or the established customs and regulations of the district in which such appropriations have been made, shall be respected and upheld to the extent of the amount of water actually appropriated."

In the same year, 1891, it was provided that in any suit regarding water rights all parties taking water from the same source might be made parties to the suit, in order that all rights might be settled in a single action.

In 1905 the office of state engineer was created, but he was given no control over the waters of the state.

In 1909 a new code of water laws was adopted. The state board of control was created and given control over the waters of the state. This board consisted of the state engineer and the superintendents of the two water divisions into which the state was divided. Parties wishing to acquire rights are required to make application to the state engineer for a permit. When rights have been perfected in accordance with a permit proof is submitted to the board of control, which issues a certificate showing what rights have been acquired.

This law also provided a new procedure for adjudicating existing rights. The state engineer and the superintendent of the water division in which the source, the rights to which are being adjudicated, is located, collect all information regarding rights, make surveys of streams, ditches, and lands, and prepare findings and an order defining all rights. All testimony, reports of surveys, and the findings and order are filed with the court, which holds hearings, and issues a decree fixing all rights. Certificates are issued to all claimants in accordance with the decree of court.

Riparian rights are recognized to some extent in Oregon.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.
	Acres.	Per cent of total.	
Total	986,162	100.0	100.0
Appropriation and use	148,523	15.1	58.3
Notice filed and posted	150,332	15.3	29.0
Adjudicated by court	293,913	29.8	5.4
Permit from state	131,540	13.3	3.8
Certificate or license from state	217,228	22.0	.....
Riparian rights	14,277	1.5	3.5
Underground	3,235	0.3	(1)
Other and mixed	12,159	1.2	(1)
Not reported	14,955	1.5	(1)

[1] This class was not included in the tabulation in 1909. All land for which the class of water rights was not reported was included in "Appropriation and use."

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributaries were included in those reported for the main streams. This area is so small, however, that the comparison of the areas reported for the tributary streams is not seriously affected.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 19 (acres
	1919	1902	Per cent of increase.[1]		
Total	986,162	439,981	124.1	1,925,987	1,344,(
Columbia River and tributaries	638,223	232,145	174.9	1,145,451	846,(
Columbia River direct	92	198	−53.5	223	
Snake River and tributaries	394,205	167,790	134.9	628,588	489,
Snake River direct	22,199	415	.....	31,925	25,
Owyhee River	36,295	13,215	174.7	78,311	42,
Malheur River	52,850	40,686	29.9	117,688	79,
Burnt River	34,287	16,042	113.7	54,467	37,
Powder River	146,036	58,482	149.7	188,463	165,
Pine Creek	12,635	10,149	24.5	40,637	39,
Imnaha River	4,828	3,781	27.7	10,146	6,
Grande Ronde River	79,191	22,628	250.0	98,774	87,
Other tributaries of Snake River	5,884	[2] 2,392	146.0	8,177	6,
Walla Walla River	17,514	3,321	427.4	18,457	17,
Umatilla River	43,571	4,485	871.5	99,012	83,
Willow Creek	5,553	3,013	84.3	7,159	6,
John Day River	36,141	27,604	30.9	48,191	41,
Deschutes River	111,916	21,108	430.2	291,014	174,
Hood River	19,765	2,837	596.7	39,660	21,
Willamette River	2,892	448	545.5	4,656	4,
Other tributaries of Columbia River	6,574	[2] 1,341	390.2	8,491	7,
Rogue River and tributaries	38,569	13,900	177.5	131,131	52,
Rogue River direct	3,256	538	505.2	14,166	4,
Little Butte Creek	6,706	1,208	455.1	54,383	8,
Bear Creek	8,319	2,902	186.7	28,275	14,
Evans Creek	1,333	225	492.4	2,746	1,
Applegate River	10,659	4,239	151.5	17,335	13,
Illinois River	4,961	2,804	76.9	8,705	6,
Other tributaries of Rogue River	3,335	[2] 1,984	68.1	5,521	4,
Klamath River and tributaries	90,570	27,724	226.7	239,940	135,
Klamath River direct	3,185	105	.....	5,910	5,
Lost River	58,568	1,180	.....	194,748	95,
Sprague River	7,800	3,690	111.4	10,150	9,
Other tributaries of Klamath River	21,017	[2] 22,749	−7.6	29,132	24,
Other Pacific Ocean streams	2,134	([3])	.....	8,695	3,
Independent streams	216,666	166,212	30.4	400,770	305,
Deep Creek	1,906	2,165	−12.0	2,118	2,
Donner and Blitzen River	21,356	34,701	−38.5	54,931	27,
Silver Creek	16,819	13,609	23.6	42,779	17,
Silvies River	64,842	26,041	149.0	102,258	95,
Thomas Creek	5,386	1,980	172.0	5,866	5,
Other independent streams	106,357	[2] 87,716	21.3	192,818	156,

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,(
[2] Includes springs and wells.
[3] Not reported separately in 1902.

CAPITAL INVESTED AND COST OF OPERATIO AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.[1]	AVERAGE PER ACR	
			Amount.	Per ce of in crease
1920	$28,929,151	126.7	$21.52	4
1910	12,760,214	592.1	15.36	22
1900	1,843,771	123.3	4.75	
1890	825,660	.....	4.64	.....

[1] A minus sign (−) denotes decrease.

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNIN

DATE OF BEGINNING.	Amount.	Per cent of total.	Averag per acr
Total	$28,929,151	100.0	$21
Before 1860	151,216	0.5	16
1860–1869	398,603	1.4	7
1870–1879	1,072,943	3.7	10
1880–1889	2,321,551	8.0	9
1890–1899	1,666,226	5.8	11
1900–1904	4,193,262	14.5	24
1905–1909	10,876,802	37.6	45
1910–1914	2,741,335	9.5	24
1915–1919	4,759,181	16.4	31
Not reported	748,032	2.6	6

TABLE 10. CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$28,929,151	100.0	$21.52	801,891	$1.19
Stream, gravity	20,028,187	69.2	18.71	631,124	1.00
Stream, pumped	2,807,806	9.7	34.61	59,087	3.09
Stream, pumped and gravity	3,700	(2)	14.07	253	2.55
Wells, pumped	118,306	0.4	48.93	1,419	8.01
Wells, flowing	6,900	(2)	47.26	66	9.47
Wells, pumped and flowing	2,600	(2)	7.65	20	18.00
Lake, pumped	26,583	0.1	14.88	457	2.52
Lake, gravity	783,702	2.7	24.66	1,735	0.90
Springs	165,916	0.6	15.64	6,735	0.92
Stored storm water	124,499	0.4	22.55	3,287	1.28
City water	153,650	0.5	582.01	252	23.89
Sewage	1,500	(2)	150.00	.....	.....
Stream, gravity, and pumped wells	11,500	(2)	100.52	95	17.89
Stream, gravity, and flowing wells	1,000	(2)	5.00	200	4.00
Other mixed	4,691,072	16.2	33.73	97,014	1.13
Not reported	2,200	(2)	14.97	147	0.78

[1] Based on acreage irrigated in 1919.
[2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, 1920 AND 1902, CLASSIFIED BY DRAINAGE BASIN.

DRAINAGE BASIN.	1920	1902	INCREASE.	
			Amount.	Per cent.[1]
Total	$28,929,151	$2,089,609	$26,839,542	.....
Columbia River and tributaries	18,480,068	1,385,671	17,094,397	.....
Columbia River direct	11,150	3,500	7,650	218.6
Snake River and tributaries	7,093,052	971,743	6,121,909	630.0
Snake River direct	909,478	15,154	894,324	.....
Owyhee River	1,154,185	191,736	962,449	502.0
Malheur River	2,027,683	282,898	1,744,785	616.8
Burnt River	649,491	65,691	573,800	873.5
Powder River	1,552,987	268,101	1,284,886	479.3
Pine Creek	97,522	36,595	60,927	166.5
Imnaha River	206,378	10,885	195,493	.....
Grande Ronde River	471,436	82,011	389,425	474.8
Other tributaries of Snake River	34,492	[2] 18,672	15,820	84.7
Walla Walla River	280,934	4,885	276,049	.....
Umatilla River	4,308,892	61,430	4,247,462	.....
Willow Creek	60,139	20,375	39,764	195.2
John Day River	510,248	120,060	390,188	325.0
Deschutes River	5,078,636	138,755	4,939,881	.....
Hood River	807,269	54,000	753,269	.....
Willamette River	100,561	3,240	97,321	.....
Other tributaries of Columbia River	228,587	[2] 7,683	220,904	.....
Rogue River and tributaries	1,783,989	147,223	1,636,766	.....
Rogue River direct	165,665	7,540	158,125	.....
Little Butte Creek	604,794	10,490	594,304	.....
Bear Creek	615,878	20,895	594,983	.....
Evans Creek	40,836	2,675	38,161	.....
Applegate River	180,894	60,325	120,569	199.9
Illinois River	87,966	27,748	60,218	217.0
Other tributaries of Rogue River	87,956	[2] 17,550	70,406	401.2
Klamath River and tributaries	3,811,932	247,560	3,564,372	.....
Klamath River direct	43,141	1,100	42,041	.....
Lost River	3,451,383	17,550	3,433,833	.....
Sprague River	32,368	26,560	5,808	21.9
Other tributaries of Klamath River	285,040	[2] 202,350	82,690	40.9
Other Pacific Ocean streams	191,200	(3)	191,200	.....
Independent streams	4,661,962	309,155	4,352,807	.....
Deep Creek	6,829	6,100	729	12.0
Donner and Blitzen River	131,750	35,400	96,350	272.2
Silver Creek	26,016	21,845	4,171	19.1
Silvies River	1,005,862	74,310	931,552	.....
Thomas Creek	6,506	5,360	1,146	21.4
Other independent streams	3,484,999	[2] 166,140	3,318,859	.....

[1] Per cent not shown when more than 1,000.
[2] Includes springs and wells.
[3] Not reported separately in 1902.

In classifying capital invested by type of enterprise (Table 12) the average capital invested per acre is not presented, for the reason that it is not possible to compute this correctly. The United States Reclamation Service supplies stored water to enterprises controlled by agencies of some of the other classes shown in the table and a part of its expenditure is properly chargeable to those lands, but it is not possible to tell how much should be so charged or how it should be distributed among the various classes.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$28,929,151	100.0	801,891	$1.19
Individual and partnership	6,584,382	22.8	463,527	0.95
Cooperative	3,143,698	10.8	157,111	1.09
Irrigation district	6,313,753	21.8	72,535	1.56
Carey Act	3,231,298	11.2	30,665	2.26
Commercial	3,281,034	11.3	18,638	2.47
U. S. Reclamation Service	5,956,950	20.6	54,981	1.85
U. S. Indian Service	230,038	0.8	4,000	1.00
State	16,107	0.1	.....	.....
City	171,068	0.6	330	18.39
Other	823	(2)	104	0.44

[1] Based on acreage irrigated in 1919. [2] Less than one-tenth of 1 per cent.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	176
Acreage included in enterprises reporting land drained or needing drainage	347,750
Acreage for which drains have been installed	93,799
Additional acreage needing drainage	46,115
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	27.0
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	4.9
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	7.3

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. Those representing estimates are reported separately in Table 14.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume of water entering canals, second-feet	8,311	2,926	5,385
Area irrigated in 1919.....acres	446,014	180,022	265,992
Average number of acres per second-foot	54	62	49
Total quantity of water entering canals, acre-feet	2,237,727	1,016,713	1,221,014
Area irrigated in 1919.....acres	498,843	212,100	286,743
Average quantity per acre.....acre-feet	4.5	4.8	4.3
Total quantity of water delivered.....acre-feet	458,880	159,035	299,845
Area irrigated in 1919.....acres	206,448	109,326	97,122
Average quantity per acre.....acre-feet	2.2	1.5	3.1

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	3,285	309	5,252	28,897	7,115	2,784	1,956	266	1,905,037
Before 1860	50	1	76	154	108	12	10	2	2
1860–1869	188	6	293	925	407	111	62	7	97
1870–1879	362	12	662	3,338	755	302	163	8	18,774
1880–1889	839	79	1,155	4,080	1,433	450	238	32	2,370
1890–1899	536	43	754	3,552	985	538	302	39	40,134
1900–1904	330	26	520	3,752	805	263	179	24	184,378
1905–1909	240	35	386	5,530	741	387	558	49	1,308,879
1910–1914	209	43	486	3,207	742	248	216	41	53,639
1915–1919	195	33	393	2,648	635	204	195	48	296,449
Not reported	336	31	527	611	504	269	33	16	315

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	159.6	65	11,968	208	47,026	573	13,769	614	600,045
Before 1860	2.3					1	8	1	700
1860–1869	4.5					3	55	3	60
1870–1879	13.6					6	40	6	1,050
1880–1889	6.7			1	110	6	564	7	47,300
1890–1899	29.3	14	137	1	800	14	181	14	8,625
1900–1904	30.5	17	10,055	3	557	27	419	29	18,520
1905–1909	20.6	4	572	14	2,095	82	1,051	86	44,957
1910–1914	28.5	15	405	38	9,280	173	7,250	193	251,708
1915–1919	20.1	8	225	75	19,029	198	3,563	201	182,794
Not reported	3.5	5	574	54	8,060	63	638	74	44,331
		2		22	7,095				

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	3,285	309	5,252	28,897	7,115	2,784	1,956	266	1,905,037
Individual and partnership	3,095	266	4,957	13,531	5,380	1,880	748	231	317,273
Cooperative	145	24	213	6,246	924	600	385	16	228,471
Irrigation district	16	9	39	2,105	347	70	246	9	719,700
Carey Act	5	2	9	2,665	130	14	64		
Commercial	12	6	15	1,279	189	35	183	7	122,850
U. S. Reclamation Service	5	2	9	2,884	117	170	305	3	516,743
U. S. Indian Service	1		3	160	19	12	24		
State			1	8					
City	3		4	18	7				
Other	3		2	1	2	3	1		

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	159.6	65	11,968	208	47,026	573	13,769	614	600,045
Individual and partnership	65.8	63	11,668	200	42,101	541	6,338	552	339,340
Cooperative	12.8			6	2,925	14	3,793	25	116,955
Irrigation district	43.6					15	3,463	34	109,750
Carey Act	0.9								
Commercial	20.3	2	300	2	2,000	2	145	2	4,000
U. S. Reclamation Service	14.0								
U. S. Indian Service	0.3					1	30	1	30,000
State	0.9								
City	1.0								
Other									

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	3,285	309	5,252	28,897	7,115	2,784	1,956	266	1,905,037
Columbia River and tributaries	2,458	168	3,901	19,161	5,300	1,866	1,256	153	796,736
Columbia River direct	.....	.....	4	2	1	.....	.....	3	1
Snake River and tributaries	1,162	103	2,150	10,917	3,121	772	489	109	634,859
Snake River direct	.....	.....	40	330	105	9	7	1	4,743
Owyhee River	96	18	125	1,555	236	8	11	15	19,195
Malheur River	256	34	350	2,022	540	92	84	31	368,446
Burnt River	213	8	318	781	400	20	14	14	12,331
Powder River	291	19	651	3,754	1,133	287	202	37	13,484
Pine Creek	51	4	83	176	107	7	18	3	10,350
Imnaha River	34	1	86	102	73	16	13	1	200
Grande Ronde River	203	19	475	1,883	483	329	138	6	205,230
Other tributaries of Snake River	18	.....	22	314	44	4	2	1	880
Walla Walla River	101	7	170	404	140	331	66	4	15,000
Umatilla River	139	10	229	2,007	318	201	143	4	54,700
Willow Creek	71	7	94	110	94	18	11	.....	.....
John Day River	504	8	670	1,052	655	151	52	10	39,236
Deschutes River	361	25	390	4,023	768	226	333	8	52,927
Hood River	34	5	72	435	88	86	132	5	13
Willamette River	15	.....	40	148	53	15	5	2	.....
Other tributaries of Columbia River	71	3	82	63	62	66	25	8	.....
Rogue River and tributaries	257	18	645	1,978	837	169	117	47	35,882
Rogue River direct	8	.....	26	149	38	2	3	9	1
Little Butte Creek	13	2	58	161	108	86	50	3	5,350
Bear Creek	29	6	99	512	159	18	37	10	30,507
Evans Creek	22	.....	34	66	41	11	3	.....	.....
Applegate River	55	4	164	434	241	17	8	15	16
Illinois River	87	3	135	400	127	19	10	4	1
Other tributaries of Rogue River	43	3	129	256	123	16	6	6	7
Klamath River and tributaries	57	18	121	3,162	231	259	324	20	927,311
Klamath River direct	4	.....	22	62	43	3	.....	.....	.....
Lost River	8	13	39	1,889	71	113	232	14	925,923
Sprague River	9	5	15	212	34	6	8	6	1,388
Other tributaries of Klamath River	36	.....	45	999	83	137	84	.....	.....
Other Pacific Ocean streams	78	8	107	238	92	39	20	5	10,005
Independent streams	435	97	478	4,358	655	451	239	41	135,103
Deep Creek	1	.....	10	18	11	.....	.....	.....	.....
Donner and Blitzen River	44	6	30	239	74	122	84	6	57,580
Silver Creek	24	1	24	398	39	31	2	.....	.....
Silvies River	206	72	187	876	220	115	54	17	360
Thomas Creek	.....	.....	10	10	28	.....	.....	1	.....
Other independent streams	160	18	217	2,817	283	183	99	17	77,163

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	159.6	65	11,968	208	47,026	573	13,769	614	600,045	28
Columbia River and tributaries	132.2	19	1,182	178	32,077	416	11,470	442	491,607	28
Columbia River direct	2.5			9	178	11	42	12	2,418	45
Snake River and tributaries	29.2	12	1,102	39	9,818	176	9,289	190	377,160	24
Snake River direct	14.4					46	5,594	60	185,022	31
Owyhee River	2.4	4	787	2	240	60	1,312	60	80,153	28
Malheur River	2.0			2	60	10	521	10	30,010	17
Burnt River	1.0					3	24	3	965	17
Powder River	7.9	8	315	13	4,780	14	1,601	14	69,132	33
Imnaha River	0.1					4	23	4	500	40
Grande Ronde River	1.1			20	4,203	35	189	35	10,743	12
Other tributaries of Snake River	0.3			2	535	4	25	4	635	12
Walla Walla River	23.6	1		88	19,325	90	467	93	19,425	25
Umatilla River	14.3	2		6	171	13	115	13	4,246	34
Willow Creek	0.3					1	2	1	200	12
John Day River	5.7			6	475	45	413	47	41,280	25
Deschutes River	8.5			3	386	22	764	26	36,564	38
Hood River	38.6	3	10	1	17	5	36	5	755	70
Willamette River	3.2			15	1,369	30	220	32	7,813	24
Other tributaries of Columbia River	6.3	1	70	11	338	23	122	23	1,746	52
Rogue River and tributaries	20.5	3	10,000	23	11,499	102	723	111	38,147	26
Rogue River direct	7.1			11	6,964	44	347	44	16,597	30
Little Butte Creek	0.8					1	9	1		23
Bear Creek	6.3			9	1,133	28	120	36	8,138	23
Evans Creek	0.5					5	77	5	1,175	29
Applegate River	2.1					8	93	8	3,200	26
Illinois River	1.0			2	402	7	32	8	3,067	11
Other tributaries of Rogue River	2.7	3	10,000	1	3,000	9	45	9	5,970	25
Klamath River and tributaries	3.0	1	35	2	1,600	31	1,301	36	62,475	31
Klamath River direct	1.7					14	453	15	30,775	31
Lost River	0.6			2	1,600	14	786	16	21,100	22
Other tributaries of Klamath River	0.7	1	35			3	62	5	10,600	30
Other Pacific Ocean streams	3.2	1				10	66	10	3,705	49
Independent streams	0.7	41	751	5	1,850	14	209	15	4,111	26
Deep Creek		1				1	6	2	1,000	10
Donner and Blitzen River		1	10			1		1		16
Silver Creek		1	2	2	450	3	6	3	550	15
Silvies River				2	1,200	2	26	2	1,265	22
Other independent streams	0.7	38	739	1	200	7	171	9	1,296	51

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF CROPS GROWN ON IRRIGATED LAND AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are reported in state bulletin on agriculture.]

	CROP.	AREA HARVESTED.					QUANTITY HARVESTED.					
		1919		1909		Per cent of increase.[1]	Unit.	1919		1909		Per cent of increase.[1]
		Acres.	Per cent of total for state.	Acres.	Per cent of total for state.			Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Corn	1,764	5.5	686	4.0	157.1	Bu.	62,167	7.3	17,921	4.0	246.9
2	Oats	7,980	2.8	20,415	6.0	−60.9	Bu.	235,637	2.8	896,427	8.2	−73.7
3	Winter wheat	4,511	0.6	21,059	2.8	24.9	Bu.	78,649	0.5	569,942	4.6	−18.2
4	Spring wheat	21,799	8.3				Bu.	387,487	11.3			
5	Barley	7,602	11.4	18,305	16.9	−58.7	Bu.	216,493	15.1	565,074	23.8	−61.7
6	Rye	1,920	4.5	1,458	11.3	32.3	Bu.	18,470	5.9	17,662	12.0	4.6
	Hay and forage:											
7	Timothy alone	5,340	17.4	16,297	40.6	−67.2	Tons	7,066	15.5	31,871	47.4	−77.8
8	Timothy and clover mixed	23,377	28.6	17,592	26.4	32.9	Tons	33,484	24.7	31,009	24.0	8.0
9	Clover alone	5,275	9.9	1,549	3.3	240.5	Tons	9,795	9.5	3,337	4.0	193.5
10	Alfalfa	102,409	48.6	100,623	83.6	1.8	Tons	309,206	52.2	331,515	88.3	−6.7
11	Other tame grasses	7,094	8.6	3,442	5.5	106.1	Tons	9,759	6.8	6,329	5.9	54.2
12	Small grains cut for hay	23,022	4.9	14,172	3.8	73.2	Tons	26,695	4.6	21,530	4.2	29.7
13	Annual legumes cut for hay	1,523	6.2				Tons	1,219	3.1			
14	Wild, salt, or prairie grasses	51,453	22.7	138,143	63.3	−62.8	Tons	49,792	18.6	157,100	63.1	−68.3
15	Silage crops	1,432	4.3	(2)			Tons	6,578	3.6	(2)		
	Vegetables:											
16	Potatoes	1,880	4.7	3,402	7.7	−44.7	Bu.	181,986	5.1	413,167	8.6	−56.0
	Fruits:											
17	Grapes	[3] 8,525	2.4	(2)			Lbs.	110,395	3.9	(2)		
18	Apples	[4] 177,789	5.4	(2)			Bu.	402,912	5.8	(2)		
19	Peaches	[4] 25,953	6.3	(2)			Bu.	50,692	10.0	(2)		
20	Pears	[4] 115,520	15.9	(2)			Bu.	141,258	18.6	(2)		
21	Plums and prunes	[4] 21,664	0.7	(2)			Bu.	36,930	1.7	(2)		
22	Cherries	[4] 6,656	1.7	(2)			Bu.	7,803	2.6	(2)		

	CROP.	AVERAGE YIELD PER ACRE, 1919.						VALUE.				
		Unit.	For state.	On non-irrigated land.	On irrigated land.			1919		1909		Per cent of increase [1]
					Average.	Per cent of average for state.	Per cent of average on nonirrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Corn	Bu.	26.5	26.0	35.2	132.8	135.4	$102,576	7.3	$15,187	4.9	575.4
2	Oats	Bu.	29.4	29.4	29.5	100.3	100.3	223,855	2.8	485,570	9.6	−53.9
3	Winter wheat	Bu.	19.7	19.7	17.4	88.3	88.3	165,949	0.5	507,089	4.7	94.0
4	Spring wheat	Bu.	13.0	12.6	17.8	136.9	141.3	817,598	11.3			
5	Barley	Bu.	21.5	20.6	28.5	132.6	138.3	335,564	15.1	380,643	25.2	−11.8
6	Rye	Bu.	7.4	7.3	9.6	129.7	131.5	38,787	5.9	14,463	10.9	168.2
	Hay and forage:											
7	Timothy alone	Tons	1.48	1.52	1.32	89.2	86.8	176,650	15.5	285,065	39.4	−38.0
8	Timothy and clover mixed	Tons	1.66	1.75	1.43	86.1	81.7	770,132	24.7	286,819	19.8	168.5
9	Clover alone	Tons	1.94	1.95	1.86	95.9	95.4	200,797	9.5	41,106	4.4	388.5
10	Alfalfa	Tons	2.81	2.62	3.02	107.5	115.3	6,493,326	52.2	2,756,375	84.2	135.5
11	Other tame grasses	Tons	1.74	1.77	1.38	79.3	78.0	175,662	6.8	61,342	5.7	186.4
12	Small grains cut for hay	Tons	1.24	1.25	1.16	93.5	92.8	560,595	4.6	228,339	4.0	156.2
13	Annual legumes for hay	Tons	1.61	1.66	0.80	49.7	48.2	24,380	3.1			
14	Wild, salt, or prairie grasses	Tons	1.18	1.24	0.97	82.2	78.2	796,672	18.6	1,056,442	62.7	−24.6
15	Silage crops	Tons	5.43	5.47	4.59	84.5	83.9	65,780	3.6	(2)		
	Vegetables:											
16	Potatoes	Bu.	88.4	87.9	96.8	109.5	110.1	382,171	5.1	243,019	11.6	57.3
	Fruits:											
17	Grapes	Lbs.	[5] 7.9	[5] 7.7	[5] 12.9	163.3	167.5	6,624	3.9	(2)		
18	Apples	Bu.	[6] 2.1	[6] 2.1	[6] 2.3	109.5	109.5	543,931	5.8	(2)		
19	Peaches	Bu.	[6] 1.2	[6] 1.2	[6] 2.0	166.7	166.7	78,573	10.0	(2)		
20	Pears	Bu.	[6] 1.0	[6] 1.0	[6] 1.2	120.0	120.0	226,013	18.6	(2)		
21	Plums and prunes	Bu.	[6] 0.7	[6] 0.7	[6] 1.7	242.9	242.9	81,246	1.7	(2)		
22	Cherries	Bu.	[6] 0.8	[6] 0.8	[6] 1.2	150.0	150.0	27,310	2.6	(2)		

[1] A minus sign (−) denotes decrease.
[2] Not reported separately in 1909.
[3] Number of vines of bearing age.
[4] Number of trees of bearing age.
[5] Yield per vine.
[6] Yield per tree.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100.]

		THE STATE.	Baker.[1]	Crook.[2]	Deschutes.[2]	Douglas.	Gilliam.	Grant.
1	Number of all farms in 1920	50,206	1,509	561	751	2,275	454	728
2	Number of farms irrigated in 1919	9,154	1,102	301	550	78	53	364
3	Per cent of all farms	18.2	73.0	53.7	73.2	3.4	11.7	50.0
4	Number of farms irrigated in 1909	6,669	1,051	546	.....	132	51	341
5	Per cent of increase, 1909-1919	37.3	4.9	.....	.....	—40.9	.....	6.7
	LAND AND FARM AREA.							
6	Approximate land area—acres	61,188,480	1,975,040	1,877,760	1,961,600	3,194,240	768,640	2,892,800
7	All land in farms—acres	13,542,318	493,145	554,960	144,979	506,305	488,941	750,160
8	Improved land in farms—acres	4,913,851	163,317	93,957	51,744	136,553	259,002	74,729
9	Area irrigated in 1919—acres	956,162	171,490	42,708	57,293	1,901	3,208	32,409
10	Per cent of improved land in farms	20.1	105.0	45.5	110.7	1.4	1.3	43.4
11	Area irrigated in 1909—acres	685,129	129,673	55,900	.....	1,708	2,087	36,069
12	Per cent of increase, 1909-1919	39.7	32.2	.....	.....	11.3	53.0	—10.1
13	Area enterprises were capable of irrigating in 1920—acres	1,344,046	218,671	52,757	106,246	3,328	3,810	38,728
14	Area enterprises were capable of irrigating in 1910—acres	830,526	136,014	111,360	.....	4,500	2,367	38,631
15	Per cent of increase, 1910-1920	61.8	60.8	.....	.....	—26.0	61.0	0.3
16	Area included in enterprises in 1920—acres	1,925,987	259,361	62,449	176,387	8,370	4,621	42,079
17	Area included in enterprises in 1910—acres	2,527,208	241,919	453,811	.....	9,349	3,370	73,578
18	Per cent of increase, 1910-1920	—23.8	7.2	.....	.....	—10.5	37.1	—42.8
19	Area of irrigated land reported as available for settlement—acres	98,609	2,002	1,278	23,675	.....	.....	.....
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	4,710	825	158	38	93	52	289
21	Number, 1910	3,745	566	202	.....	107	43	310
	Main ditches:							
22	Number, 1920	5,252	959	212	35	98	51	512
23	Number, 1910	3,582	606	217	.....	86	47	396
24	Length, 1920—miles	7,115	1,461	313	255	87	60	516
25	Length, 1910—miles	5,539	1,175	504	.....	79	54	513
26	Capacity, 1920—second-feet	28,897	3,925	734	2,898	234	64	801
27	Capacity, 1910—second-feet	39,686	7,631	2,907	.....	320	202	1,771
	Laterals:							
28	Number, 1920	2,784	302	97	93	38	19	90
29	Number, 1910	2,518	313	222	.....	31	96	140
30	Length, 1920—miles	1,956	201	111	142	20	5	41
31	Length, 1910—miles	2,052	309	340	.....	8	33	37
	Reservoirs:							
32	Number, 1920	266	53	3	4	4	1	8
33	Number, 1910	271	75	11	.....	4	4	5
34	Capacity 1920—acre-feet	1,905,037	36,145	47,101	5,123	10,005	.....	36,896
35	Capacity, 1910—acre-feet	1,024,266	100,938	11,856	.....	5	2	8
	Flowing wells:							
36	Number, 1920	65	8	.....	.....	1	.....	.....
37	Number, 1910	51	3	.....	.....	.....	.....	.....
38	Capacity, 1920—gallons per minute	11,968	315	.....	.....	.....	.....	.....
39	Capacity, 1910—gallons per minute	3,035	19	.....	.....	.....	.....	.....
	Pumped wells:							
40	Number, 1920	208	13	2	.....	.....	1	1
41	Number, 1910	92	4	.....	.....	.....	4	1
42	Capacity, 1920—gallons per minute	47,026	4,780	371	.....	.....	20	30
43	Capacity, 1910—gallons per minute	20,883	1,003	.....	.....	.....	66	35
	Pumping plants:							
44	Number, 1920	573	19	11	1	9	8	2
45	Number, 1910	229	8	5	.....	3	10	1
46	Engine capacity, 1920—horsepower	13,769	1,668	430	200	56	41	12
47	Engine capacity, 1910—horsepower	3,095	159	512	.....	13	43	1
48	Pump capacity, 1920—gallons per minute	600,045	71,297	23,121	7,500	3,225	1,710	22,530
49	Pump capacity, 1910—gallons per minute	118,514	5,964	5,548	.....	583	2,621	35
50	Average lift, 1920—feet	28	31	32	120	54	21	28
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920—dollars	28,929,151	2,153,639	1,789,917	2,758,084	188,894	110,909	261,362
52	Capital invested to July 1, 1910—dollars	12,760,214	1,446,334	1,961,817	.....	78,127	32,809	241,086
53	Per cent of increase, 1910-1920	126.7	48.9	.....	.....	141.8	238.0	8.4
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	21.52	9.85	33.93	25.96	56.76	29.11	6.75
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	15.36	10.63	17.62	.....	17.36	13.86	6.24
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920—dollars	41,585,742	2,941,589	2,115,043	4,747,115	294,994	111,409	266,507
57	Estimated final cost of existing enterprises in 1910—dollars	39,216,619	5,272,463	4,842,082	.....	78,127	32,809	250,956
58	Per cent of increase, 1910-1920	6.0	—44.2	.....	.....	277.6	239.6	6.2
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	21.59	11.34	33.87	26.91	35.24	24.11	6.33
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	15.52	21.79	10.67	.....	8.36	9.74	3.41

[1] Part of Union County annexed in 1902.

[2] Parts of Crook County were taken to form Jefferson County in 1915 and Deschutes County in 1916.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.]

		Harney.	Hood River.[1]	Jackson.	Jefferson.[2]	Josephine.	Klamath.	Lake.
1	Number of all farms in 1920	589	878	1,720	572	727	992	549
2	Number of farms irrigated in 1919	295	811	754	53	419	508	256
3	Per cent of all farms	50.1	92.4	43.8	9.3	57.6	51.2	46.6
4	Number of farms irrigated in 1909	256	464	426	.....	401	266	198
5	Per cent of increase, 1909–1919	15.2	74.8	77.0	.....	4.5	91.0	29.3
	LAND AND FARM AREA.							
6	Approximate land area—acres	6,357,120	345,600	1,788,160	1,138,560	1,047,680	3,839,360	5,068,800
7	All land in farms—acres	524,678	38,075	312,936	440,926	97,299	357,333	526,218
8	Improved land in farms—acres	176,934	19,664	92,310	132,812	29,537	152,742	183,396
9	Area irrigated in 1919—acres	119,429	19,765	24,002	3,320	14,903	90,993	99,220
10	Per cent of improved land in farms	67.5	100.5	26.0	2.5	50.5	59.6	54.1
11	Area irrigated in 1909—acres	129,135	8,071	12,239	.....	12,866	46,975	57,078
12	Per cent of increase, 1909–1919	−7.5	144.9	96.1	.....	15.8	93.7	73.8
13	Area enterprises were capable of irrigating in 1920—acres	157,588	21,101	34,931	3,943	18,294	135,449	149,467
14	Area enterprises were capable of irrigating in 1910—acres	136,621	14,150	17,978	.....	14,503	62,785	59,612
15	Per cent of increase, 1910–1920	15.3	49.1	94.3	.....	26.1	115.7	150.7
16	Area included in enterprises in 1920—acres	224,301	39,660	107,195	6,171	25,127	239,478	183,997
17	Area included in enterprises in 1910—acres	561,548	48,964	82,427	.....	24,059	208,105	273,546
18	Per cent of increase, 1910–1920	−60.1	−19.0	30.0	.....	4.4	15.1	−32.7
19	Area of irrigated land reported as available for settlement—acres	2,000	15,060	2,200	.....	394	2,000	.....
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	328	77	345	51	309	90	149
21	Number, 1910	228	75	276	.....	269	52	171
	Main ditches:							
22	Number, 1920	299	72	363	62	292	115	153
23	Number, 1910	143	61	245	.....	221	42	133
24	Length, 1920—miles	413	88	537	82	311	237	267
25	Length, 1910—miles	306	86	305	.....	220	162	247
26	Capacity, 1920—second-feet	1,752	435	1,048	117	952	3,135	2,767
27	Capacity, 1910—second-feet	1,826	369	1,748	.....	931	2,964	2,212
	Laterals:							
28	Number, 1920	278	86	124	10	49	255	181
29	Number, 1910	327	50	53	.....	35	69	99
30	Length, 1920—miles	153	132	100	3	20	321	98
31	Length, 1910—miles	151	68	57	.....	17	160	54
	Reservoirs:							
32	Number, 1920	32	5	23	1	24	14	17
33	Number, 1910	28	13	25	.....	19	8	17
34	Capacity, 1920—acre-feet	133,765	13	35,871	700	11	926,361	77,513
35	Capacity, 1910—acre-feet	363,140	5	45,907	.....	7	181,274	64,901
	Flowing wells:							
36	Number, 1920	32	3	.....	.....	3	1	9
37	Number, 1910	25	.....	2	.....	1	20	.....
38	Capacity, 1920—gallons per minute	179	10	.....	.....	10,000	35	572
39	Capacity, 1910—gallons per minute	54	.....	225	.....	17	2,720	.....
	Pumped wells:							
40	Number, 1920	5	1	12	1	11	2	1
41	Number, 1910	1	1	14	.....	11	.....	.....
42	Capacity, 1920—gallons per minute	1,650	17	10,133	15	1,366	1,600	200
43	Capacity, 1910—gallons per minute	400	100	5,533	.....	2,200	.....	.....
	Pumping plants:							
44	Number, 1920	9	5	51	6	51	31	6
45	Number, 1910	2	2	21	.....	32	2	.....
46	Engine capacity, 1920—horsepower	38	36	345	9	378	1,303	171
47	Engine capacity, 1910—horsepower	10	10	165	.....	168	224	.....
48	Pump capacity, 1920—gallons per minute	1,815	755	18,410	240	19,737	62,475	2,296
49	Pump capacity, 1910—gallons per minute	496	231	19,086	.....	9,881	9,720	.....
50	Average lift, 1920—feet	18	70	28	10	24	26	44
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920—dollars	1,280,776	807,142	1,462,938	84,300	265,575	3,802,551	3,504,761
52	Capital invested to July 1, 1910—dollars	410,980	361,714	457,936	.....	239,327	1,910,580	769,906
53	Per cent of increase, 1910–1920	211.6	123.1	219.5	.....	11.0	99.0	355.2
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	8.13	38.25	41.88	21.38	14.52	28.07	23.45
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	3.01	25.56	25.47	.....	16.50	30.43	12.92
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920—dollars	2,036,296	1,174,817	4,807,783	85,943	285,645	5,566,847	3,896,381
57	Estimated final cost of existing enterprises in 1910—dollars	2,501,980	392,214	1,770,936	.....	239,327	5,110,580	7,338,681
58	Per cent of increase, 1910–1920	−18.6	199.5	171.5	.....	19.4	8.9	−46.9
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	9.08	29.62	44.85	13.93	11.37	23.25	21.18
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	4.46	8.01	21.48	.....	9.95	24.56	26.83

[1] Organized from part of Wasco County in 1908.

[2] Organized from part of Crook County in 1915.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100.]

		Malheur.	Morrow.	Umatilla.	Union.[1]	Wallowa.	Wasco.[2]	Wheeler.	All other counties.
1	Number of all farms in 1920	1,322	692	2,353	1,279	1,149	1,339	359	29,408
2	Number of farms irrigated in 1919	946	191	1,149	469	427	267	137	24
3	Per cent of all farms	71.6	27.6	48.8	36.7	37.2	19.9	38.2	0.1
4	Number of farms irrigated in 1909	622	143	685	432	293	88	184	90
5	Per cent of increase, 1909–1919	52.1	33.6	67.7	8.6	45.7	.....	—25.5	.....
	LAND AND FARM AREA.								
6	Approximate land area—acres	6,325,120	1,296,000	2,049,920	1,284,480	2,028,160	1,499,520	1,090,560	13,359,360
7	All land in farms—acres	465,851	781,613	1,075,400	441,735	524,029	728,226	485,178	3,746,331
8	Improved land in farms—acres	129,365	290,290	621,660	178,021	141,404	213,553	40,104	1,732,757
9	Area irrigated in 1919—acres	109,463	10,031	56,050	53,183	52,445	9,382	7,475	7,402
10	Per cent of improved land in farms	84.6	3.5	9.0	29.9	37.1	4.4	18.6	0.4
11	Area irrigated in 1909—acres	67,626	7,541	31,022	35,831	39,370	5,703	6,253	982
12	Per cent of increase, 1909–1919	61.9	33.0	80.7	48.4	33.2	64.5	19.5	653.8
13	Area enterprises were capable of irrigating in 1920—acres	143,266	15,561	91,543	61,444	56,601	13,611	8,692	9,015
14	Area enterprises were capable of irrigating in 1910—acres	79,210	8,116	50,213	37,260	42,855	5,989	6,983	1,379
15	Per cent of increase, 1910–1920	80.9	91.7	82.3	64.9	32.1	127.3	24.5	553.7
16	Area included in enterprises in 1920—acres	219,475	19,941	104,015	69,414	64,513	48,742	11,005	9,686
17	Area included in enterprises in 1910—acres	208,025	14,937	94,169	45,517	54,692	17,276	9,414	102,502
18	Per cent of increase, 1910–1920	5.5	33.5	10.5	52.5	18.0	182.1	16.9	—90.6
19	Area of irrigated land reported as available for settlement—acres	10,000	.....	6,000	.....	.....	34,000	.....	.....
	IRRIGATION WORKS.								
	Independent enterprises:								
20	Number, 1920	354	109	497	311	230	148	156	101
21	Number, 1910	330	121	281	225	160	79	164	86
	Main ditches:								
22	Number, 1920	496	110	375	362	295	144	185	62
23	Number, 1910	311	148	278	164	144	83	206	51
24	Length, 1920—miles	820	124	416	404	337	160	179	48
25	Length, 1910—miles	645	123	350	255	249	62	164	40
26	Capacity, 1920—second-feet	4,013	551	1,932	1,381	1,398	328	271	161
27	Capacity, 1910—second-feet	4,168	542	2,267	7,062	1,913	199	490	164
	Laterals:								
28	Number, 1920	86	50	507	197	160	90	46	26
29	Number, 1910	271	94	263	159	62	106	64	64
30	Length, 1920—miles	82	45	175	97	87	99	16	8
31	Length, 1910—miles	350	27	254	87	56	26	16	2
	Reservoirs:								
32	Number, 1920	43	.....	8	1	7	10	1	7
33	Number, 1910	42	2	10	1	1	2	1	3
34	Capacity, 1920—acre-feet	317,979	.....	69,700	20	205,430	1	2,400	3
35	Capacity, 1910—acre-feet	188,443	1	54,154	1	12,500	1	1,120	3
	Flowing wells:								
36	Number, 1920	4	.....	3	.....	.....	1	.....	.....
37	Number, 1910	.....	.....	.....	.....	.....	.....	.....	.....
38	Capacity, 1920—gallons per minute	787	.....	.....	.....	.....	70	.....	.....
39	Capacity, 1910—gallons per minute	.....	.....	.....	.....	.....	.....	.....	.....
	Pumped wells:								
40	Number, 1920	5	.....	94	20	.....	20	.....	19
41	Number, 1910	.....	3	29	12	.....	5	.....	7
42	Capacity, 1920—gallons per minute	835	.....	19,496	4,203	.....	516	.....	1,794
43	Capacity, 1910—gallons per minute	.....	220	7,892	2,045	.....	459	.....	930
	Pumping plants:								
44	Number, 1920	117	2	103	34	5	41	21	41
45	Number, 1910	29	4	39	22	2	15	6	26
46	Engine capacity, 1920—horsepower	7,409	22	582	186	26	273	266	318
47	Engine capacity, 1910—horsepower	410	24	259	96	56	169	69	707
48	Pump capacity, 1920—gallons per minute	294,620	1,700	23,671	10,578	665	8,974	14,195	10,531
49	Pump capacity, 1910—gallons per minute	26,513	1,125	10,840	4,136	850	3,856	4,940	12,089
50	Average lift, 1920—feet	27	18	26	12	32	49	21	26
	CAPITAL INVESTED.								
51	Capital invested to Jan. 1, 1920—dollars	4,057,373	1,393,045	3,309,599	260,912	497,791	486,627	159,590	293,396
52	Capital invested to July 1, 1910—dollars	2,032,636	187,716	2,019,161	136,204	198,064	96,167	76,305	103,345
53	Per cent of increase, 1910–1920	99.6	642.1	63.9	91.6	151.3	406.0	109.1	183.9
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	28.32	89.52	36.15	4.25	8.79	35.75	18.36	32.55
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	25.66	23.13	40.21	3.66	4.62	16.06	10.93	.....
	ESTIMATED FINAL COST.								
56	Estimated final cost of existing enterprises in 1920—dollars	4,835,543	1,628,878	4,428,916	262,522	618,521	998,752	167,495	314,746
57	Estimated final cost of existing enterprises in 1910—dollars	5,057,171	187,716	2,593,387	136,204	211,114	96,167	76,305	3,028,370
58	Per cent of increase, 1910–1920	—4.4	767.7	70.8	92.7	193.0	938.6	119.5	—89.6
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	22.03	81.68	42.58	3.78	9.59	20.49	15.22	32.49
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	24.31	12.57	27.54	2.99	3.86	5.57	8.11	.....

[1] Part annexed to Baker County in 1902.

[2] Part taken to form Hood River County in 1908.

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FOURTEENTH CENSUS OF THE UNITED STATES: 1920

DEPARTMENT OF COMMERCE

BULLETIN

BUREAU OF THE CENSUS

IRRIGATION : SOUTH DAKOTA

STATISTICS FOR THE STATE AND ITS COUNTIES

Prepared under the supervision of WILLIAM LANE AUSTIN, Chief Statistician for Agriculture, by R. P. TEELE, Special Agent in Charge of Irrigation

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INTRODUCTION.

This bulletin presents the statistics of irrigation for the state of South Dakota collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the bulletin figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	74,637	77,644	−3,007	−3.9
Approximate land area of the state.....acres..	49,195,520	49,195,520		
All land in farms.....acres..	34,636,491	26,016,892	8,619,599	33.1
Improved land in farms.....acres..	18,199,250	15,827,208	2,372,042	15.0
Number of farms irrigated	1,198	500	698	139.6
Area irrigated.....acres..	100,682	63,248	37,434	59.2
Area enterprises were capable of irrigating.....acres..	150,914	128,481	22,433	17.5
Area included in enterprises.....acres..	188,382	201,625	−13,243	−6.6
Per cent irrigated:				
Number of all farms	1.6	0.6	1.0	
Approximate land area of state	0.2	0.1	0.1	
Land in farms	0.3	0.2	0.1	
Improved land in farms	0.6	0.4	0.2	
Excess of area enterprises were capable of irrigating over area irrigated.....acres..	50,232	65,233	−15,001	−23.0
Excess of area included in enterprises over area irrigated.....acres..	87,700	138,377	−50,677	−36.6
Capital invested	$5,465,248	$3,043,140	$2,422,108	79.6
Average per acre enterprises were capable of irrigating	$36.21	$23.69	$12.52	52.8
Estimated final cost of existing enterprises	$5,500,748	$3,800,556	$1,700,192	44.7
Average per acre included in enterprises	$29.20	$18.85	$10.35	54.9
Average cost of operation and maintenance per acre	$1.26	$0.64	$0.62	96.9

[1] A minus sign (−) denotes decrease.

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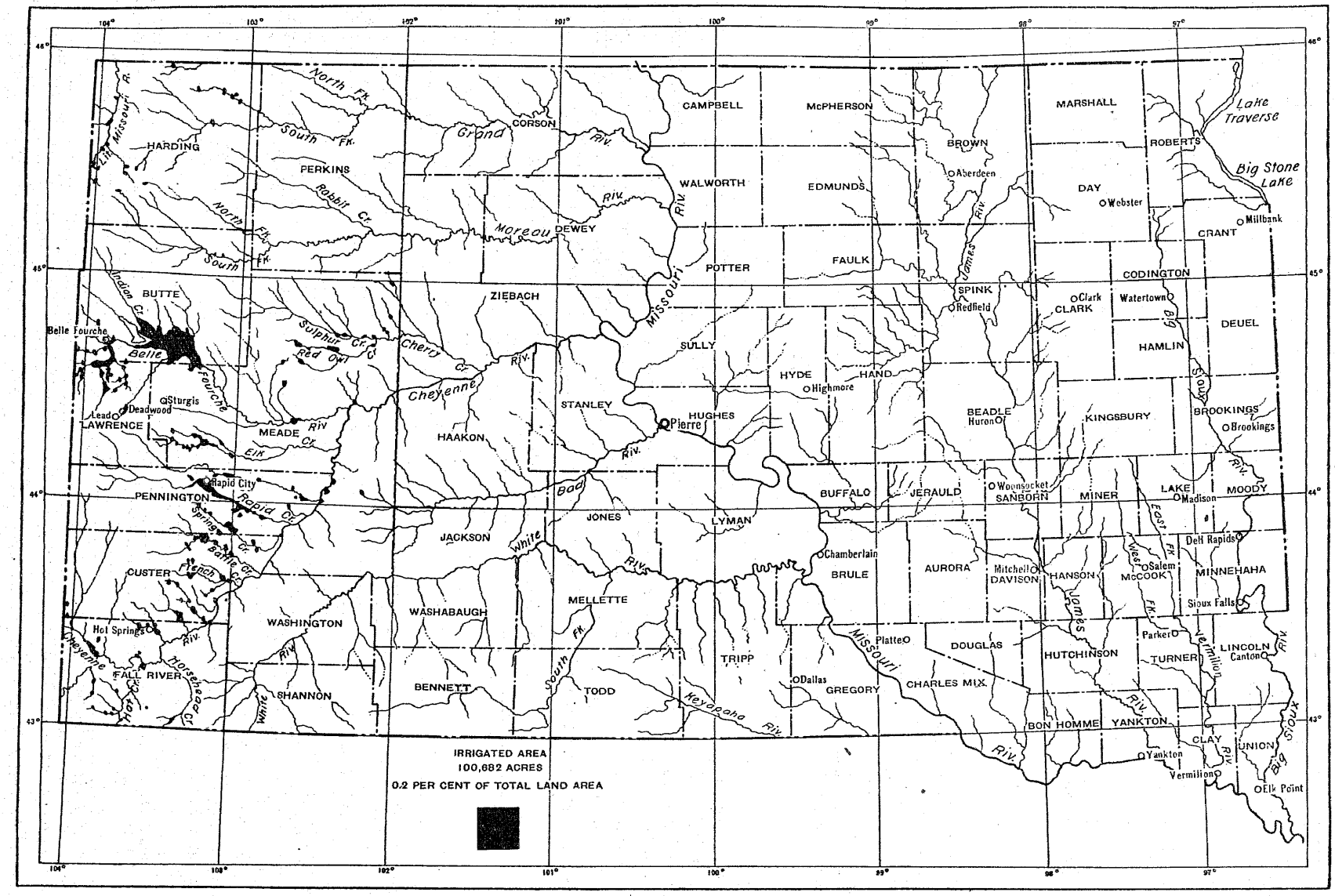
(2)

SOUTH DAKOTA

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.



EXPLANATION OF TERMS.

Farms irrigated.—The number of "farms irrigated" is the number on which irrigation is practiced, and for the purposes of this inquiry a "farm" is defined as for the general census of agriculture; that is, to be classed as a farm an establishment either must be 3 acres in extent or must have produced crops to the value of $250 in 1919, or must have required for its agricultural operations the continuous services of at least one person. "Number of farms irrigated" as used in this report and in that of 1910, is equivalent to the term "number of irrigators" used in census reports on irrigation previous to 1910.

Irrigation enterprise.—An "enterprise" is an independent irrigation establishment and includes the works for supplying water and the land to which water is supplied or is to be supplied, except that the cost or value of the land is not included in the "capital invested."

Acreage irrigated, in enterprises, and available for settlement.—Acreage irrigated is the acreage to which water was actually applied in the season preceding the census year—1919 for the Fourteenth Census and 1909 for the Thirteenth Census.

Acreage to which enterprises were capable of supplying water relates to the season following the time of taking the census and, consequently, is based on estimates made by those controlling the enterprises.

Acreage included in enterprises represents the extent of the plans of those controlling enterprises.

Acreage of irrigated land reported as available for settlement relates to land within existing enterprises and not to land that is susceptible of reclamation and settlement by new enterprises or extensions of existing enterprises.

Types of enterprises.—The types of enterprises under which all data are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands. In addition to serving land within its own projects, the United States Reclamation Service supplies stored water to land within other enterprises.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who may own no interest in the works.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization.

Capital invested.—The capital invested in irrigation enterprises is that reported by the owners. For the larger works the capital invested is taken, in most cases, from books of account and represents the actual investment. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the capital reported represents the owners' estimates. The schedules used in 1910 called for "cost," while the schedule used in the present census calls for "capital invested," but the instructions accompanying the schedules make these two terms equivalent. In both cases the investment includes cost of construction and of acquiring rights. The latter usually consists of filing fees only, but in some instances it includes the purchase price of rights. However, these cases are so rare that they are unimportant. The cost reported for 1900 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. For the Thirteenth and Fourteenth Censuses the average cost per acre is based on the acreage which enterprises were capable of irrigating in the census year and the cost to the date of the census—January 1, 1920, for the Fourteenth Census, and July 1, 1910, for the Thirteenth Census.

Operation and maintenance.—Cost of operation and maintenance was not reported on all schedules, and averages are based on the acreages for which cost is reported. No estimate of total cost of operation and maintenance for all irrigation enterprises has been made. In the case of enterprises operating pumping plants the cost of operation and maintenance includes cost of fuel and attendance.

Water rights.—The acreage irrigated has been classified by the character of rights under which water is received. The classes used are defined as follows:

"*Appropriation and use*" includes all rights acquired without formalities of any kind that have not been defined by the courts.

"*Notice filed and posted*" includes rights for which claims of some kind have been either posted or filed that have not been defined by the courts.

"*Adjudicated by court*" includes all rights that have been defined by the courts.

"*Permit from state*" includes all rights initiated under laws requiring any party wishing to acquire rights to obtain a permit from the state.

"*Certificate or license from the state*" includes rights acquired under laws providing for the issuing by the state of certificates or licenses defining rights acquired.

"*Riparian rights*" includes rights based on the ownership of riparian land.

"*Underground*" represents water taken from wells.

Source of water supply.—In classifying acreage by source of supply from which water for irrigation is obtained, in 1910 acreage was credited to what seemed to be the principal source of supply, while in the census of 1920 the attempt is made to represent the facts more nearly by presenting various mixed classes.

Date of beginning.—The date of beginning of irrigation enterprises is, in some cases, the date when construction began, and, in other cases, the date of filing a claim or of applying for a permit. If a filing or application for permit was made and work was begun and continued with reasonable diligence the date of filing is considered the date of beginning, otherwise the date of construction is taken as the date of beginning.

Drainage basin.—The drainage basin of a stream is all of the land drained by the stream and its tributaries.

Units of quantity and capacity.—Capacities of canals, reservoirs, wells, pumps, and engines, and quantities of water used are expressed in the units commonly used in engineering literature to express the same items. They are as follows:

Capacities of canals and volumes of flowing water are given in second-feet, a shorter equivalent for cubic feet per second.

Capacities of wells and pumps are given in gallons per minute Four hundred and fifty gallons per minute equal 1 second-foot.

Capacities of reservoirs are given in acre-feet. An acre-foot is the quantity of water that will cover 1 acre to a depth of 1 foot. It equals 43,560 cubic feet.

Capacities of engines and motors are given in horsepower. One horsepower is the power required to lift 33,000 pounds through a vertical distance of 1 foot in 1 minute of time.

CLIMATIC CONDITIONS.

South Dakota lies in the semiarid region, the normal annual precipitation at the eastern border being between 20 and 25 inches, and at the western border about 15 inches. For the western half of the state it averages about 17 inches, and more than 80 per cent of this occurs during the growing season. In the Black Hills the precipitation is higher than in the surrounding territory, but in that section there is little arable land.

The average precipitation for the state in 1919 was slightly above normal, but in the north central and northwestern parts of the state there was a deficiency during the latter part of the growing season.

Crops are grown throughout the state without irrigation, but in the extreme western counties considerable areas are irrigated.

WATER SUPPLY FOR IRRIGATION.

The streams of western South Dakota are all tributaries of the Missouri, which flows across the state from north to south about midway of the state.

The Little Missouri flows across the northwest corner of the state, in a northerly direction. It is a typical plains stream with a flood flow in early summer and a very limited supply of water in the late summer.

The Belle Fourche rises in eastern Wyoming and flows into South Dakota around the northern base of the Black Hills and discharges into Cheyenne River. It receives many tributaries from the Black Hills as well as from the north. The United States Reclamation Service has built a large reservoir near the town of Belle Fourche to store flood waters. This reservoir supplies water to more than half of the irrigated land in the state.

Cheyenne River also rises in eastern Wyoming and flows into South Dakota. It skirts the southern base of the Black Hills, from which it receives many tributaries. Proposals for storing the flood waters of this stream, as has been done on the Belle Fourche, have been investigated, but they have not been carried out.

White River lies south of the Cheyenne and Moreau River lies north of the Cheyenne. These are plains streams that supply little water in late summer, and have been little used for irrigation. Here, as on the other streams, water is available for storage, if economically feasible projects can be found.

In western South Dakota there are many drainage channels that carry water only after storms or when snows are melting, and the state has enacted laws to encourage the construction of reservoirs in such channels to store water for irrigation.

South Dakota has many artesian wells, but most of these are in the valleys of the Missouri and the James where rainfall is sufficient for the growing of crops.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.[1]	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	1,198	139.6	1.6	100,682	59.2	0.2	0.3	0.6
1910	500	−17.5	0.6	63,248	44.8	0.1	0.2	0.4
1900	606	220.6	1.2	43,676	177.9	0.1	0.2	0.4
1890	189	.....	0.4	15,717	.....	(2)	0.1	0.2

[1] A minus sign (−) denotes decrease.
[2] Less than one-tenth of 1 per cent.

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of acreage in enterprises.	
Total	292	188,382	100,682	53.4	150,914
1870–1879	22	14,495	11,302	78.0	12,435
1880–1889	43	17,692	11,441	64.7	13,215
1890–1899	30	7,906	2,965	37.5	5,591
1900–1904	35	104,773	58,570	55.9	87,539
1905–1909	80	21,791	8,927	41.0	18,368
1910–1914	51	13,471	5,633	41.8	8,220
1915–1919	16	2,604	1,126	43.2	2,336
Not reported	15	5,650	718	12.7	3,210

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	100,682	63,248	37,434	59.2	150,914	188,382
Stream, gravity	92,491	47,122	45,369	96.3	130,476	160,199
Stream, pumped	869	540	329	60.9	3,211	4,308
Wells, pumped	.....	8	−8	−100.0	.....	.....
Wells, flowing	130	1,448	−1,318	−91.0	130	250
Lake, gravity	170	200	−30	−15.0	300	520
Springs	326	395	−69	−17.5	326	936
Stored storm water	2,312	13,535	−11,223	−82.9	7,652	11,907
Stream, gravity, and pumped wells	500	(2)	500	.....	1,000	1,000
Stream, gravity, and flowing wells	20	(2)	20	.....	40	160
Other mixed	3,864	(2)	3,864	.....	7,779	9,102

[1] A minus sign (−) denotes decrease. [2] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF ENTERPRISE.

Early legislation in South Dakota relating to organization for supplying water for irrigation all referred to the development of artesian wells. A law of 1890 provided for the organization of artesian well companies; another dated 1891 provided for the sinking of artesian wells by civil townships and the supplying of water for rentals; and another law passed in 1893 provided for the sinking of wells by counties, the counties bearing one-fourth of the expense, and the land benefited three-fourths. The small area reported

n Table 4 as irrigated from artesian wells indicates hat these laws have not been effective, at least so far s irrigation is concerned.

An irrigation district law was enacted in 1917, but o irrigation districts were reported in 1920.

South Dakota accepted the conditions of the Federal Carey Act (act of Aug. 18, 1894) in 1909, but no Carey Act enterprises were reported in 1920.

The United States Reclamation Service has one project in the state.

TABLE 5. ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Acres.	Per cent.
ACREAGE IRRIGATED.				
Total	100,682	63,248	37,434	59.2
Individual and partnership	31,664	37,684	−6,020	−16.0
Cooperative	10,686	13,601	−3,521	−25.9
Commercial	2,280	6,300	−4,020	−63.8
U. S. Reclamation Service	56,638	5,613	51,025	909.1
U. S. Indian Service	20	50	−30	−60.0
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	150,914	128,481	22,433	17.5
Individual and partnership	56,032	55,820	212	0.4
Cooperative	10,815	18,243	−7,428	−41.8
Commercial	1,600	6,800	−5,200	−76.5
U. S. Reclamation Service	82,592	47,508	35,024	73.8
U. S. Indian Service	75	50	25	50.0
ACREAGE INCLUDED IN ENTERPRISES.				
Total	188,382	201,625	−13,243	−6.6
Individual and partnership	76,683	69,971	6,712	9.6
Cooperative	11,410	22,687	−11,277	−49.7
Commercial	2,280	6,900	−4,620	−67.0
U. S. Reclamation Service	97,934	101,967	−4,033	−4.0
U. S. Indian Service	75	100	−25	−25.0

[1] A minus sign (−) denotes decrease.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of South Dakota relating to water rights are summarized in the following paragraphs:

The state of South Dakota was created in 1889 from a part of Dakota territory. In 1881 Dakota territory enacted the following general declaration regarding rights to water:

"Any person or persons, corporation or company, who may have or hold a possessory right or title to any mineral or agricultural lands within the limits of this state shall be entitled to the usual enjoyment of the waters of the streams or creeks in said state for mining, milling, agricultural, or domestic purposes; provided, that the right to such use shall not interfere with any prior right or claim to such waters when the law has been complied with in doing the necessary work." The same law provided for securing rights of way over the lands lying between the streams and the places of use, and for the posting and filing of notices of intended appropriations.

In 1905 South Dakota adopted a new water law. This law provided that "all the waters within the limits of the state from all sources of water supply belong to the public and, except as to navigable waters, are subject to appropriation for beneficial use." It created the office of state engineer, provided that parties wishing to acquire rights must apply to the engineer for permits to appropriate water; for the submitting of proof of completion of works and the issuing of certificates of completion; and for the submitting of proof of use of water and the issuing of licenses defining the rights acquired.

This law provided also that the state engineer should make surveys and collect the information necessary for the adjudication of rights acquired previous to the passage of the act; that, on the advice of the engineer, the attorney general of the state should intervene in suits relating to water rights or initiate such suits; and that when suits were brought in the courts the courts should call on the engineer to make surveys of the streams in question at the expense of the litigants.

The supreme court of the state has held this law unconstitutional so far as it interferes with vested riparian rights and so far as it relates to participation in adjudication by the state engineer at the expense of litigants. (St. Germain Irrigating Ditch Co. *v.* Hawthorne Ditch Co., 32 S. D., 260.)

Under this decision riparian rights seem to be paramount in South Dakota.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.
	Acres.	Per cent of total.	
Total	100,682	100.0	100.0
Appropriation and use	1,774	1.8	21.2
Notice filed and posted	62,054	61.6	35.0
Adjudicated by court	7,651	7.6	14.8
Permit from state	17,500	17.4	7.4
Certificate or license from state	8,612	8.6	17.5
Riparian rights	1,599	1.6	3.6
Underground	130	0.1	(1)
Other and mixed	190	0.2	(1)
Not reported	1,172	1.2	(1)

[1] This class was not included in the classification in 1910. All land for which the class of water rights was not reported was included in "Appropriation and use."

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributaries were included in those reported for the main streams. This area is so small, however, that the comparison of the areas reported for the tributary streams is not seriously affected.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Total	100,682	53,137	89.5	188,382	150,914
Missouri River and tributaries	100,682	53,137	89.5	188,382	150,914
Missouri River direct				600	150
Cheyenne River[2]	99,333	49,547	100.5	176,715	143,847
Little Missouri River	640	700	−8.6	4,133	3,323
Moreau River	305	335	−9.0	3,094	1,721
Other tributaries of Missouri River	404	[3] 2,555	−84.2	3,840	1,873

[1] A minus sign (−) denotes decrease. [2] Includes Belle Fourche River.
[3] Includes springs and wells.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.
1920	$5,465,248	79.6	$36.21	52.8
1910	3,043,140	968.7	23.69	263.3
1900	284,747	345.1	6.52	60.2
1890	63,968	.....	4.07	.....

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$5,465,248	100.0	$36.21
1870-1879	261,476	4.8	21.03
1880-1889	149,465	2.7	11.31
1890-1899	94,851	1.7	16.96
1900-1904	4,543,349	83.1	51.90
1905-1909	221,514	4.1	12.06
1910-1914	106,127	1.9	12.91
1915-1919	63,308	1.2	27.10
Not reported	25,158	0.5	7.84

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$5,465,248	100.0	$36.21	88,329	$1.26
Stream, gravity	5,122,271	93.7	39.26	83,672	1.21
Stream, pumped	93,340	1.7	29.07	807	4.03
Wells, flowing	5,000	0.1	38.46	.....	.....
Lake, gravity	2,100	(2)	7.00	.....	.....
Springs	18,421	0.3	56.51	31	17.74
Stored storm water	155,121	2.8	20.27	1,203	2.78
Stream, gravity, and pumped wells	3,000	0.1	3.00	.....	.....
Stream, gravity, and flowing wells	480	(2)	12.00	.....	.....
Other mixed	65,515	1.2	8.42	2,616	1.14

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.	
			Amount.	Per cent.[1]
Total	$5,465,248	$381,569	$5,083,679	.....
Missouri River and tributaries	5,465,248	381,569	5,083,679	.....
Missouri River direct	3,512	.....	3,512	.....
Cheyenne River[2]	5,277,782	325,657	4,952,125	.....
Little Missouri River	55,818	3,740	52,078	.....
Moreau River	40,927	3,731	37,196	996.9
Other tributaries of Missouri River	87,209	[3] 48,441	38,768	80.0

[1] Per cent not shown when more than 1,000.
[2] Includes Belle Fourche River.
[3] Includes springs and wells.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$5,465,248	100.0	88,329	$1.26
Individual and partnership	743,880	13.6	20,711	1.26
Cooperative	240,030	4.4	8,680	0.66
Commercial	15,058	0.3	2,280	0.61
U. S. Reclamation Service	4,464,780	81.7	56,638	1.37
U. S. Indian Service	1,500	(2)	20	2.50

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	17
Acreage included in enterprises reporting land drained or needing drainage	106,129
Acreage for which drains have been installed	2,109
Additional acreage needing drainage	4,714
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	2.0
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	1.1
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	3.6

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume of water entering canals..second-feet..	581	171	410
Area irrigated in 1919.....acres..	69,286	56,938	12,348
Average number of acres per second-foot.....	119	333	30
Total quantity of water entering canals.....acre-feet..	168,186	121,487	46,699
Area irrigated in 1919.....acres..	67,366	56,638	10,728
Average quantity per acre.....acre-feet..	2.5	2.1	4.4
Total quantity of water delivered.....acre-feet..	83,574	81,568	2,006
Area irrigated in 1919.....acres..	59,618	56,638	2,980
Average quantity per acre.....acre-feet..	1.4	1.4	0.7

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	207	182	370	5,427	653	632	605	119	212,264
1870–1879	20	2	22	1,701	78	26	12	.....	.....
1880–1889	30	3	49	481	99	65	19	4	92
1890–1899	22	6	32	370	51	84	42	4	700
1900–1904	23	54	41	1,813	165	92	361	15	205,404
1905–1909	55	75	117	390	141	239	136	60	4,127
1910–1914	38	31	73	613	75	86	30	27	1,840
1915–1919	11	6	17	51	19	30	1	7	100
Not reported	8	5	19	8	25	10	4	2	1

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	7.2	4	2,750	1	800	25	498	25	23,320
1870–1879	.....	1	500	.....	.....	.....	.....	.....	.....
1880–1889	0.2	.....	.....	.....	.....	2	40	2	5,000
1890–1899	0.2	1	650	.....	.....	.....	.....	.....	.....
1900–1904	5.5	1	800	.....	.....	1	20	1	600
1905–1909	0.8	.....	.....	.....	.....	6	66	6	3,930
1910–1914	0.5	1	800	1	800	10	233	10	7,456
1915–1919	.....	.....	.....	.....	.....	5	139	5	6,330
Not reported	.....	.....	.....	.....	.....	1	.....	1	.....

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	207	182	370	5,427	653	632	605	119	212,264
Individual and partnership	199	181	354	2,114	442	599	201	118	8,494
Cooperative	5	.....	6	1,678	65	21	4	.....	.....
Commercial	1	.....	1	35	8	.....	.....	.....	.....
U. S. Reclamation Service	1	1	8	1,600	137	12	400	1	203,770
U. S. Indian Service	1	.....	1	.....	1	.....	.....	.....	.....

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	7.2	4	2,750	1	800	25	498	25	23,320
Individual and partnership	1.3	4	2,750	1	800	25	498	25	23,320
Cooperative	.....	.....	.....	.....	.....	.....	.....	.....	.....
Commercial	.....	.....	.....	.....	.....	.....	.....	.....	.....
U. S. Reclamation Service	5.9	.....	.....	.....	.....	.....	.....	.....	.....
U. S. Indian Service	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	207	182	370	5,427	653	632	605	119	212,264
Missouri River and tributaries	207	182	370	5,427	653	632	605	119	212,264
Missouri River direct			1	3	3				
Cheyenne River[1]	182	95	297	5,210	568	511	580	64	205,941
Little Missouri River	9	16	26	90	34	24	13	19	2,283
Moreau River	3	55	29	33	24	26	4	19	2,262
Other tributaries of Missouri River	13	16	17	91	24	71	8	17	1,778

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	7.2	4	2,750	1	800	25	498	25	23,320	21
Missouri River and tributaries	7.2	4	2,750	1	800	25	498	25	23,320	21
Missouri River direct						1	40	1	1,500	25
Cheyenne River[1]	6.8	4	2,750	1	800	14	173	14	9,550	16
Little Missouri River	0.1					4	175	4	8,000	32
Moreau River	0.3					3	60	3	1,800	30
Other tributaries of Missouri River						3	50	3	2,470	19

[1] Includes Belle Fourche River.

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are shown in state bulletin on agriculture.]

	CROP.	AREA HARVESTED.					QUANTITY HARVESTED.					
		1919		1909				1919		1909		
		Acres.	Per cent of total for state.	Acres.	Per cent of total for state.	Per cent of increase.[1]	Unit.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]
	Cereals:											
1	Corn	2,176	0.1	1,166	0.1	86.6	Bu.	39,667	0.1	25,476	(2)	55.7
2	Oats	3,026	0.2	2,526	0.2	19.8	Bu.	71,692	0.1	91,045	0.2	−21.3
3	Winter wheat	759	0.6	1,329	(2)	781.0	Bu.	7,335	0.6	25,590	0.1	449.7
4	Spring wheat	10,949	0.3				Bu.	133,341	0.4			
5	Barley	1,026	0.1	317	(2)	223.7	Bu.	17,841	0.1	6,086	(2)	193.1
	Other grains and seeds:											
6	Clover and alfalfa seed[3]	1,040	3.3	(4)	.....	.....	Bu.	2,358	4.3	(4)	.....	.....
	Hay and forage:											
7	Timothy alone	539	0.5	1,927	1.1	−72.0	Tons.	566	0.4	3,352	1.3	−83.1
8	Timothy and clover mixed	1,989	3.0	2,116	1.6	−6.0	Tons.	1,953	2.2	3,189	1.5	−38.8
9	Alfalfa	38,519	8.3	10,005	15.1	285.0	Tons.	74,193	9.7	28,520	18.5	160.1
10	Small grains cut for hay	1,708	1.6	(4)	.....	.....	Tons.	1,720	2.3	(4)	.....	.....
11	Wild, salt, or prairie grasses	3,825	0.1	17,652	0.6	−78.3	Tons.	3,026	0.1	20,334	0.7	−85.1
	Vegetables:											
12	Potatoes	413	0.7	439	0.9	−5.9	Bu.	35,065	1.2	35,066	1.0	−1.7
	Miscellaneous:											
13	Sugar beets grown for sugar	1,052	95.1	(4)	.....	.....	Tons.	11,782	98.6	(4)	.....	.....

	CROP.	AVERAGE YIELD PER ACRE, 1919.						VALUE.				
		Unit.	For state.	On non-irrigated land.	On irrigated land.			1919		1909		
					Average.	Per cent of average for state.	Per cent of average on non-irrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]
	Cereals:											
1	Corn	Bu.	25.1	25.1	18.2	72.5	72.5	$51,567	0.1	$17,582	0.1	194.1
2	Oats	Bu.	27.8	27.8	23.7	85.3	85.3	53,769	0.1	42,035	0.3	27.9
3	Winter wheat	Bu.	9.3	9.3	10.0	107.5	107.5	16,357	0.6	21,100	(2)	.....
4	Spring wheat	Bu.	7.9	7.9	12.2	154.4	154.4	297,350	0.4	3,143	(2)	581.2
5	Barley	Bu.	17.0	17.0	17.4	102.4	102.4	21,409	0.1			
	Other grains and seeds:											
6	Clover and alfalfa seed[3]	Bu.	1.8	1.7	2.3	127.8	135.3	53,055	4.3	(4)	.....	.....
	Hay and forage:											
7	Timothy alone	Tons.	1.13	1.14	1.05	92.9	92.1	8,490	0.4	25,290	2.0	−66.4
8	Timothy and clover mixed	Tons.	1.31	1.32	0.98	74.8	74.3	33,201	2.2	21,229	1.8	56.4
9	Alfalfa	Tons.	1.65	1.63	1.93	117.0	118.4	1,595,150	9.7	160,414	17.4	894.4
10	Small grains cut for hay	Tons.	0.69	0.69	1.01	146.4	146.4	28,380	2.3	(4)	.....	.....
11	Wild, salt, or prairie grasses	Tons.	0.74	0.74	0.79	106.8	106.8	39,338	0.1	145,667	1.3	−73.0
	Vegetables:											
12	Potatoes	Bu.	49.2	49.0	84.9	172.6	173.3	87,662	1.2	25,049	1.3	250.0
	Miscellaneous:											
13	Sugar beets grown for sugar	Tons.	10.81	3.17	11.20	103.6	353.3	117,820	98.6	(4)	.....	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Less than one-tenth of 1 per cent.
[3] Not including red clover seed.
[4] Not reported in 1910 because of small acreage.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100.]

		THE STATE.	Butte.[1]	Custer.	Fall River.	Harding.[1]	Lawrence.	Meade.	Pennington.	Perkins.[1]	All other counties.
1	Number of all farms in 1920	74,637	1,005	646	813	907	449	1,722	1,128	1,560	66,407
2	Number of farms irrigated in 1919	1,198	564	34	22	20	114	39	395	6	4
3	Per cent of all farms	1.6	56.1	5.3	2.7	2.2	25.4	2.3	35.0	0.4	(2)
4	Number of farms, irrigated in 1909	500	96	89	40	28	60	45	83	0	41
5	Per cent of increase, 1909–1919	139.6									
	LAND AND FARM AREA.										
6	Approximate land area, acres	49,195,520	1,464,960	1,005,720	1,123,840	1,716,480	510,080	2,234,240	1,786,880	1,804,960	37,487,360
7	All land in farms, acres	34,636,491	722,033	407,060	653,294	1,227,028	147,544	1,380,497	1,048,452	1,265,466	27,787,117
8	Improved land in farms, acres	18,199,250	88,367	53,416	130,594	103,467	48,213	202,562	107,630	202,081	17,202,911
9	Area irrigated in 1919, acres	100,682	57,856	5,527	2,891	928	6,219	9,969	16,994	222	76
10	Per cent of improved land in farms	0.6	65.5	10.3	2.2	0.9	12.9	4.9	16.1	0.1	(2)
11	Area irrigated in 1909, acres	63,248	14,378	7,820	4,633	3,315	3,355	7,049	19,463	897	1,438
12	Per cent of increase, 1909–1919	59.2	302.4	—29.3	—37.6	—72.0	85.4	25.4	—12.7	—75.3	—94.7
13	Area enterprises were capable of irrigating in 1920, acres	150,914	82,073	9,018	7,358	5,442	8,516	15,233	22,029	882	363
14	Area enterprises were capable of irrigating in 1910, acres	128,481	59,684	11,315	9,858	4,598	4,682	9,922	25,593	1,370	1,459
15	Per cent of increase, 1910–1920	17.5	37.5	—20.3	—25.4	18.4	81.9	53.5	—13.9	—35.6	—75.1
16	Area included in enterprises in 1920, acres	188,382	89,353	11,080	11,778	8,415	14,261	26,873	23,750	2,059	813
17	Area included in enterprises in 1910, acres	201,625	118,160	15,263	11,746	5,170	5,285	12,136	31,034	1,370	1,461
18	Per cent of increase, 1910–1920	—6.6	—24.4	—27.4	0.3	62.8	169.8	121.4	—23.5	50.3	—44.4
	IRRIGATION WORKS.										
	Independent enterprises:										
19	Number, 1920	292	21	61	24	42	48	43	40	10	3
20	Number, 1910	395	42	92	36	23	24	60	68	10	40
	Main ditches:										
21	Number, 1920	370	30	71	32	51	53	71	44	15	3
22	Number, 1910	348	41	84	31	29	21	50	62	9	21
23	Length, 1920, miles	653	181	81	58	65	73	80	96	13	6
24	Length, 1910, miles	631	177	97	63	42	31	67	126	14	14
25	Capacity, 1920, second-feet	5,427	1,908	317	107	115	322	655	1,904	90	9
26	Capacity, 1910, second-feet	3,508	1,852	380	198	68	104	219	566	172	30
	Laterals:										
27	Number, 1920	632	18	151	50	66	41	99	153	20	25
28	Number, 1910	332	23	80	49	11	52	56	41	20	.....
29	Length, 1920, miles	605	348	51	25	16	13	90	54	8	.....
30	Length, 1910, miles	625	482	39	11	8	14	35	28	8	.....
	Reservoirs:										
31	Number, 1920	119	13	19	10	42	3	19	4	9	.....
32	Number, 1910	314	52	62	48	30	3	62	43	11	3
33	Capacity, 1920, acre-feet	212,264	204,388	939	189	5,107	46	294	87	1,216	.....
34	Capacity, 1910, acre-feet	216,205	202,466	843	1,472	2,302	632	7,791	569	95	35
	Flowing wells:										
35	Number, 1920	4	.....	.....	.....	.....	4	.....	.....	.....	.....
36	Number, 1910	42	2	.....	.....	3	.....	.....	.....	.....	37
37	Capacity, 1920, gallons per minute	2,750	.....	.....	.....	.....	2,750	.....	.....	.....	.....
38	Capacity, 1910, gallons per minute	14,382	22	.....	.....	830	.....	.....	.....	.....	13,530
	Pumped wells:										
39	Number, 1920	1	.....	.....	.....	.....	.....	.....	1	.....	.....
40	Number, 1910	4	.....	.....	1	.....	.....	2	1	.....	.....
41	Capacity, 1920, gallons per minute	800	.....	.....	.....	.....	.....	.....	800	.....	.....
42	Capacity, 1910, gallons per minute	24	.....	.....	10	.....	.....	10	4	.....	.....
	Pumping plants:										
43	Number, 1920	25	3	3	2	5	.....	2	4	4	2
44	Number, 1910	8	.....	.....	4	.....	.....	2	2	.....	.....
45	Engine capacity, 1920, horsepower	498	21	28	30	187	.....	30	64	66	72
46	Engine capacity, 1910, horsepower	63	.....	.....	49	.....	.....	2	12	.....	.....
47	Pump capacity, 1920, gallons per minute	23,320	1,750	2,170	1,000	8,470	.....	1,900	2,730	1,800	3,500
48	Pump capacity, 1910, gallons per minute	5,289	.....	.....	4,975	.....	.....	10	304	.....	.....
49	Average lift, 1920, feet	21	16	14	28	27	.....	12	13	28	24
	CAPITAL INVESTED.										
50	Capital invested to Jan. 1, 1920, dollars	5,465,248	4,349,699	118,501	107,076	137,540	70,704	453,344	182,314	35,270	10,800
51	Capital invested to July 1, 1910, dollars	3,043,140	2,554,828	64,058	93,926	62,054	30,428	58,961	130,315	12,817	35,753
52	Per cent of increase, 1910–1920	79.6	70.3	85.0	14.0	121.6	132.4	668.9	39.9	175.2	—69.8
53	Average cost per acre based on area enterprises were capable of supplying with water in 1920, dollars	36.21	53.00	13.14	14.55	25.27	8.30	29.76	8.28	39.99	20.75
54	Average cost per acre based on area enterprises were capable of supplying with water in 1910, dollars	23.69	42.81	5.66	9.53	13.50	6.50	5.94	5.09	9.36	24.51
	ESTIMATED FINAL COST.										
55	Estimated final cost of existing enterprises in 1920, dollars	5,500,748	4,350,849	127,951	107,276	149,540	70,704	460,894	185,264	37,470	10,800
56	Estimated final cost of existing enterprises in 1910, dollars	3,800,556	3,312,244	64,058	93,926	62,054	30,428	58,961	130,315	12,817	35,753
57	Per cent of increase, 1910–1920	44.7	31.4	99.7	14.2	141.0	132.4	681.7	42.2	192.3	—69.8
58	Average cost per acre based on estimated final cost and area included in enterprises in 1920, dollars	29.20	48.69	11.55	9.11	17.77	4.96	17.15	7.80	18.20	13.28
59	Average cost per acre based on estimated final cost and area included in enterprises in 1910, dollars	18.85	28.03	4.20	8.00	12.00	5.76	4.86	4.20	9.36	24.47

[1] Perkins and Harding Counties organized from parts of Butte County in 1909.
[2] Less than one-tenth of 1 per cent.

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FOURTEENTH CENSUS OF THE UNITED STATES: 1920

DEPARTMENT OF COMMERCE

BULLETIN

BUREAU OF THE CENSUS

IRRIGATION : TEXAS

STATISTICS FOR THE STATE AND ITS COUNTIES

Prepared under the supervision of WILLIAM LANE AUSTIN, Chief Statistician for Agriculture, by R P. TEELE, Special Agent in Charge of Irrigation

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INTRODUCTION.

This bulletin presents the statistics of irrigation for the state of Texas collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the bulletin figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

In the reports of the Thirteenth Census the returns for the counties where irrigation is limited to rice growing and those for the remainder of the state were presented separately. In this bulletin this separation is not made, except that in the last column of the county table at the end of the bulletin totals for rice growing are given.

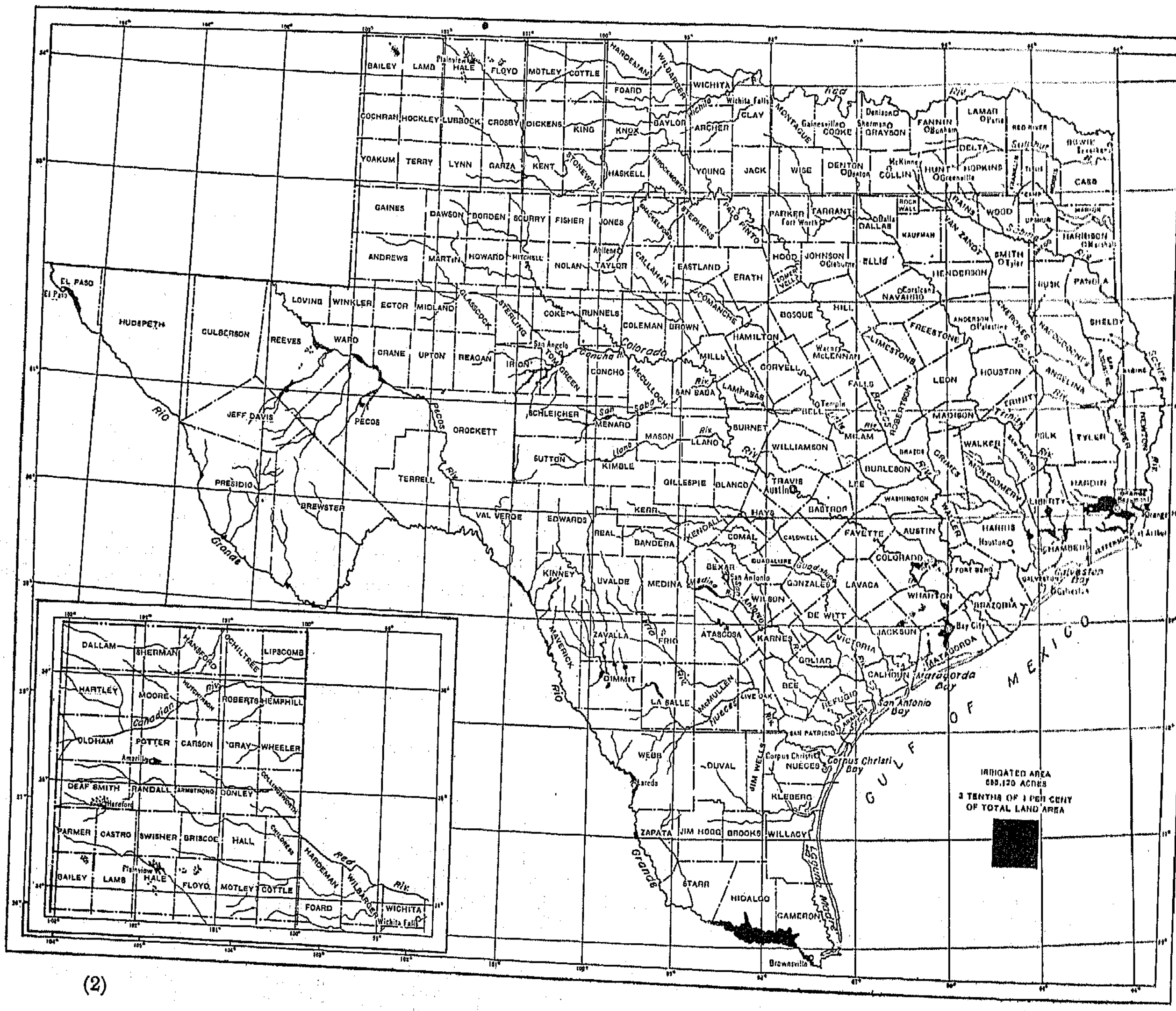
TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

ITEM.	CENSUS OF—		INCREASE.	
	1920	1910	Amount.	Per cent.
Number of all farms	436,033	417,770	18,263	4.4
Approximate land area of the state.....acres..	167,934,720	167,934,720	.....	.....
All land in farms.....acres..	114,020,621	112,435,067	1,585,554	1.4
Improved land in farms.....acres..	31,227,503	27,360,666	3,866,837	14.1
Number of farms irrigated	5,974	5,238	736	14.1
Area irrigated.....acres..	586,120	451,130	134,990	29.9
Area enterprises were capable of irrigating.....acres..	1,150,542	690,991	459,551	66.5
Area included in enterprises.....acres..	1,687,447	1,253,173	434,274	34.7
Per cent irrigated:				
Number of all farms	1.4	1.3	0.1	.....
Approximate land area of the state	0.3	0.3	.....	.....
Land in farms	0.5	0.4	0.1	.....
Improved land in farms	1.9	1.6	0.3	.....
Excess of area enterprises were capable of irrigating over area irrigated.....acres..	564,422	239,861	324,561	135.3
Excess of area included in enterprises over area irrigated.....acres..	1,101,327	802,043	299,284	37.3
Area of irrigated land reported as available for settlement....acres..	346,446	(1)	.....	.....
Capital invested	$35,072,739	$13,487,347	$21,585,392	160.0
Average per acre enterprises were capable of irrigating	$30.48	$19.52	$10.96	56.1
Estimated final cost of existing enterprises	$39,860,871	$14,754,172	$25,106,699	170.2
Average per acre included in enterprises	$23.62	$11.77	$11.85	100.7
Average cost of operation and maintenance per acre	$6.92	$3.25	$3.67	112.9

[1] Not reported in 1910.

TEXAS

Approximate Location and Extent of Irrigated Land.



EXPLANATION OF TERMS.

Farms irrigated.—The number of "farms irrigated" is the number on which irrigation is practiced, and for the purposes of this inquiry a "farm" is defined as for the general census of agriculture; that is, to be classed as a farm an establishment either must be 3 acres in extent or must have produced crops to the value of $250 in 1919, or must have required for its agricultural operations the continuous services of at least one person. "Number of farms irrigated" as used in this report and in that of 1910, is equivalent to the term "number of irrigators" used in census reports on irrigation previous to 1910.

Irrigation enterprise.—An "enterprise" is an independent irrigation establishment and includes the works for supplying water and the land to which water is supplied or is to be supplied, except that the cost or value of the land is not included in the "capital invested."

Acreage irrigated, in enterprises, and available for settlement.—Acreage irrigated is the acreage to which water was actually applied in the season preceding the census year—1919 for the Fourteenth Census and 1909 for the Thirteenth Census.

Acreage to which enterprises were capable of supplying water relates to the season following the time of taking the census and, consequently, is based on estimates made by those controlling the enterprises.

Acreage included in enterprises represents the extent of the plans of those controlling enterprises.

Acreage of irrigated land reported as available for settlement relates to land within existing enterprises and not to land that is susceptible of reclamation and settlement by new enterprises or extensions of existing enterprises.

Types of enterprises.—The types of enterprises under which all data are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands. In addition to serving land within its own projects, the United States Reclamation Service supplies stored water to land within other enterprises.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who may own no interest in the works.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization.

Capital invested.—The capital invested in irrigation enterprises is that reported by the owners. For the larger works the capital invested is taken, in most cases, from books of account and represents the actual investment. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the capital reported represents the owners' estimates. The schedules used in 1910 called for "cost," while the schedule used in the present census calls for "capital invested," but the instructions accompanying the schedules make these two terms equivalent. In both cases the investment includes cost of construction and of acquiring rights. The latter usually consists of filing fees only, but in some instances it includes the purchase price of rights. However, these cases are so rare that they are unimportant. The cost reported for 1900 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. For the Thirteenth and Fourteenth Censuses the average cost per acre is based on the acreage which enterprises were capable of irrigating in the census year and the cost to the date of the census—January 1, 1920, for the Fourteenth Census, and July 1, 1910, for the Thirteenth Census.

Operation and maintenance.—Cost of operation and maintenance was not reported on all schedules, and averages are based on the acreages for which cost is reported. No estimate of total cost of operation and maintenance for all irrigation enterprises has been made. In the case of enterprises operating pumping plants the cost of operation and maintenance includes cost of fuel and attendance.

Water rights.—The acreage irrigated has been classified by the character of rights under which water is received. The classes used are defined as follows:

"*Appropriation and use*" includes all rights acquired without formalities of any kind that have not been defined by the courts.

"*Notice filed and posted*" includes rights for which claims of some kind have been either posted or filed that have not been defined by the courts.

"*Adjudicated by court*" includes all rights that have been defined by the courts.

"*Permit from state*" includes all rights initiated under laws requiring any party wishing to acquire rights to obtain a permit from the state.

"*Certificate or license from the state*" includes rights acquired under laws providing for the issuing by the state of certificates or licenses defining rights acquired.

"*Riparian rights*" includes rights based on the ownership of riparian land.

"*Underground*" represents water taken from wells.

Source of water supply.—In classifying acreage by source of supply from which water for irrigation is obtained, in 1910 acreage was credited to what seemed to be the principal source of supply, while in the census of 1920 the attempt is made to represent the facts more nearly by presenting various mixed classes.

Date of beginning.—The date of beginning of irrigation enterprises is, in some cases, the date when construction began, and, in other cases, the date of filing a claim or of applying for a permit. If a filing or application for permit was made and work was begun and continued with reasonable diligence the date of filing is considered the date of beginning, otherwise the date of construction is taken as the date of beginning.

Drainage basin.—The drainage basin of a stream is all of the land drained by the stream and its tributaries.

Units of quantity and capacity.—Capacities of canals, reservoirs, wells, pumps, and engines, and quantities of water used are expressed in the units commonly used in engineering literature to express the same items. They are as follows:

Capacities of canals and volumes of flowing water are given in second-feet, a shorter equivalent for cubic feet per second.

Capacities of wells and pumps are given in gallons per minute. Four hundred and fifty gallons per minute equal 1 second-foot.

Capacities of reservoirs are given in acre-feet. An acre-foot is the quantity of water that will cover 1 acre to a depth of 1 foot. It equals 43,560 cubic feet.

Capacities of engines and motors are given in horsepower. One horsepower is the power required to lift 33,000 pounds through a vertical distance of 1 foot in 1 minute of time.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.[1]
	Acres.	Per cent of total.	
Total	586,120	100.0	100.0
Appropriation and use	69,334	11.8	70.8
Notice filed and posted	105,069	17.9	5.3
Adjudicated by court	2,755	0.5	(2)
Permit from state	229,753	39.2	(3)
Certificate or license from state	11,898	2.0	(3)
Riparian rights	72,396	12.4	11.7
Underground	44,649	7.6	(2)
Other and mixed	594	0.1	(2)
Not reported	49,672	8.5	(2)

[1] Exclusive of land irrigated for rice growing.
[2] This class was not included in the tabulation in 1909. All land for which the class of water rights was not reported was included in "Appropriation and use."
[3] Small areas erroneously reported as in this class. State issued no permit certificate before 1913.

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Total	586,120	[2]61,768	848.9	1,687,447	1,150,542
Rio Grande River and tributaries	315,693	39,269	703.9	883,708	681,502
Rio Grande River direct	254,186	8,749	.....	705,270	555,761
Pecos River	57,418	22,358	156.8	172,043	120,492
Las Moras Creek	1,469	680	116.0	1,534	1,519
Other tributaries of Rio Grande River	2,620	[3]7,482	−65.0	4,861	3,730
Tributaries of Gulf of Mexico	263,464	21,833	.....	780,386	456,015
Nueces River	13,753	2,663	416.4	50,006	31,977
San Antonio River	13,179	2,955	346.0	61,789	60,177
Colorado River	71,278	10,402	585.2	277,268	125,666
Brazos River	7,535	448	.....	22,896	19,560
Trinity River	42,770	(4)	.....	96,320	52,720
Neches River	64,900	(4)	.....	149,800	82,000
Sabine River	12,822	(4)	.....	24,468	20,508
Other Gulf streams	37,227	[3]5,365	593.9	97,839	63,407
Canadian River	440	340	29.4	840	440
Red River	6,523	161	.....	22,513	12,585

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes 165 acres for springs and wells not reported by drainage basins.
[3] Includes springs and wells.
[4] Not shown separately in 1902.

The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributaries were included in those reported for the main streams. This area is so small, however, that the comparison of the areas reported for the tributary streams is not seriously affected.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1900 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.[1]	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.[1]
1920	$35,072,739	160.0	$30.48	56.1
1910	13,487,347	.....	19.52	−5.7
1900	1,027,608	.....	20.70	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$35,072,739	100.0	$30.48
1860–1869	30,000	0.1	75.00
1870–1879	1,108,104	3.2	25.17
1880–1889	295,723	0.8	10.53
1890–1899	987,951	2.8	17.88
1900–1904	4,903,055	14.0	22.21
1905–1909	7,762,497	22.1	28.80
1910–1914	14,010,412	39.9	34.90
1915–1919	2,747,636	7.8	36.26
Not reported	3,227,361	9.2	58.33

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$35,072,730	100.0	$30.48	558,306	$6.92
Streams, gravity	5,631,241	16.1	39.44	66,906	1.98
Streams, pumped	19,432,010	55.4	23.70	412,118	7.65
Streams, pumped and gravity	60,000	0.2	100.00	350	8.57
Wells, pumped	2,783,200	7.9	39.24	31,749	11.07
Wells, flowing	340,538	1.0	54.13	1,528	4.45
Wells, flowing and pumped	163,057	0.5	47.57	1,253	16.69
Lakes, pumped	176,700	0.5	22.38	517	6.32
Springs	316,664	0.9	27.94	8,217	2.72
Stored storm water	4,785,276	13.6	87.42	11,386	5.51
Sewage	40,072	0.1	154.12	.....	.....
Streams, gravity, and pumped wells	34,680	0.1	44.58	454	16.83
Streams, gravity, and flowing wells	5,000	(2)	90.91	.....	.....
Other mixed	1,304,241	3.7	41.19	23,828	5.95

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.	
			Amount.	Per cent.[1]
Total	$35,072,739	[2]$1,579,118	$33,493,621	.....
Rio Grande River and tributaries	18,925,769	1,052,480	17,873,289	.....
Rio Grande River direct	16,208,058	468,100	15,739,958	.....
Pecos River	2,219,595	451,045	1,768,550	392.1
Las Moras Creek	192,566	7,925	184,641	.....
Other tributaries of Rio Grande River	305,550	[3]125,410	180,140	143.6
Tributaries of Gulf of Mexico	15,707,698	501,272	15,206,426	.....
Nueces River	1,326,555	56,808	1,269,747	.....
San Antonio River	5,087,542	63,765	5,023,777	.....
Colorado River	3,560,916	154,529	3,406,387	.....
Brazos River	569,543	25,443	544,100	.....
Trinity River	1,743,621	[4]	1,743,621	.....
Neches River	1,596,770	[4]	1,596,770	.....
Sabine River	345,935	[4]	345,935	.....
Other Gulf streams	1,476,816	[3]200,727	1,276,089	635.7
Canadian River	69,472	4,500	64,972	.....
Red River	369,800	2,250	367,550	.....

[1] Per cent not shown when more than 1,000.
[2] Includes $18,616 for springs and wells not reported by drainage basins.
[3] Includes springs and wells.
[4] Not reported separately in 1902.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$35,072,739	100.0	558,306	$6.92
Individual and partnership	8,256,568	23.5	88,008	8.10
Cooperative	3,821,844	10.9	102,764	6.76
Irrigation district	5,449,142	15.5	88,571	6.44
Commercial	13,825,409	39.4	258,614	7.05
U. S. Reclamation Service	3,673,476	10.5	20,284	2.90
State	6,802	[2]	65	27.69
City	39,498	0.1	.....	.....

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	166
Acreage included in enterprises reporting land drained or needing drainage	650,822
Acreage for which drains have been installed	272,437
Additional acreage needing drainage	154,532
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	41.9
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	16.1
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	25.3

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume of water entering canals, second-feet	5,835	817	5,018
Area irrigated in 1919.....acres	171,716	45,001	126,715
Average number of acres per second-foot	29	55	25
Total quantity of water entering canals.acre-feet	1,586,840	204,919	1,381,921
Area irrigated in 1919.....acres	247,619	47,325	200,294
Average quantity per acre.....acre-feet	6.4	4.3	6.9
Total quantity of water delivered.....acre-feet	385,540	100,869	284,671
Area irrigated in 1919.....acres	167,005	48,533	118,472
Average quantity per acre.....acre-feet	2.3	2.1	2.4

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	165	134	820	23,261	1,524	2,022	2,949	368	392,999
1860–1869		2							
1870–1879	17	6	22	875	132	416	270	4	23,307
1880–1889	7	7	22	570	56	56	47	4	
1890–1899	24	9	34	1,234	108	58	72	8	28,089
1900–1904	21	8	72	5,449	275	169	358	13	31,385
1905–1909	21	31	101	6,887	285	268	964	50	12,837
1910–1914	45	36	303	4,741	386	577	993	91	287,357
1915–1919	22	27	197	2,297	191	365	215	70	8,634
Not reported	8	8	69	1,208	91	113	30	128	1,390

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	157.1	135	62,364	901	538,565	1,369	80,511	1,641	6,825,998
1860–1869						1	50	1	
1870–1879	0.1					1	12	1	360
1880–1889	0.4			4		10	81	10	4,670
1890–1899	1.6	2		3	30	30	4,930	42	1,719,180
1900–1904	16.5	11	3,150	40	19,150	114	18,047	150	1,544,020
1905–1909	14.0	16	12,390	116	62,622	210	19,271	265	1,655,729
1910–1914	26.1	37	18,734	278	195,239	432	16,343	498	937,241
1915–1919	9.0	26	14,020	284	204,449	360	13,399	402	622,488
Not reported	89.4	43	14,070	176	57,075	211	7,769	266	341,707

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	165	134	820	23,261	1,524	2,022	2,949	368	392,999
Individual and partnership	138	108	688	6,324	649	1,408	991	345	40,082
Cooperative	10	14	49	2,059	163	174	431	13	14,217
Irrigation district	9	6	15	4,294	180	33	430	3	2,000
Commercial	7	5	64	9,807	490	392	1,097	7	336,700
U. S. Reclamation Service	1	1	3	774	40				
State			1	3	2	15			
City									

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	157.1	135	62,364	901	538,565	1,369	80,511	1,641	6,825,998
Individual and partnership	143.1	127	58,350	880	520,283	1,286	39,081	1,461	1,482,618
Cooperative	10.9	8	4,014	3	1,630	30	11,012	46	945,630
Irrigation district						9	6,605	29	857,000
Commercial	3.0			17	15,652	42	23,758	103	3,538,250
U. S. Reclamation Service	0.1					1	15	1	900
State				1	1,000	1	40	1	1,000
City									

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	165	134	820	23,261	1,524	2,022	2,949	368	392,999
Rio Grande River and tributaries	41	33	154	12,530	641	875	1,071	74	87,169
Rio Grande River direct	11	19	81	9,319	305	361	1,275	46	24,999
Pecos River	26	9	61	2,725	257	241	313	24	62,165
Las Moras Creek	2	1	4	75	8	200	67	.....	.....
Other tributaries of Rio Grande River	5	4	8	411	11	13	16	4	5
Tributaries of Gulf of Mexico	108	99	612	10,618	828	978	1,202	292	297,826
Nueces River	54	20	85	163	96	139	42	223	1,987
San Antonio River	4	10	50	1,782	60	80	82	24	260,346
Colorado River	46	53	244	3,925	324	333	639	30	8,092
Brazos River	.....	2	155	287	130	270	136	3	800
Trinity River	.....	1	6	1,022	77	47	102	1	25,000
Neches River	.....	.....	7	1,380	40	30	77	.....	.....
Sabine River	.....	.....	9	481	42	27	33	.....	.....
Other Gulf streams	4	4	56	1,578	59	52	91	11	1,601
Canadian River	.....	.....	4	4	2	8	2	.....	.....
Red River	13	2	50	109	53	161	74	2	8,004

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	157.1	135	62,364	901	538,565	1,309	80,511	1,041	6,825,998	45
Rio Grande River and tributaries	41.1	15	9,110	40	23,872	151	22,560	232	2,414,876	.....
Rio Grande River direct	40.5	.....	.....	5	2,025	105	21,779	172	2,383,251	50
Pecos River	0.6	14	9,050	42	21,509	39	719	53	28,253	53
Las Moras Creek	.....	.....	.....	.....	.....	1	6	1	250	20
Other tributaries of Rio Grande River	.....	1	60	2	338	6	56	6	3,122	56
Tributaries of Gulf of Mexico	115.8	118	50,754	803	464,943	1,157	54,456	1,346	4,358,862	41
Nueces River	92.6	81	26,065	275	72,937	321	6,533	342	169,472	47
San Antonio River	10.9	25	15,465	43	12,804	77	1,438	80	31,039	39
Colorado River	8.5	3	5,400	57	30,667	311	13,500	359	912,048	30
Brazos River	2.2	3	3,500	150	136,332	166	6,276	175	153,585	63
Trinity River	1.5	.....	.....	.....	.....	11	7,688	20	445,100	34
Neches River	.....	.....	.....	.....	.....	6	5,850	23	1,029,500	24
Sabine River	.....	.....	.....	.....	.....	9	1,855	16	187,000	14
Other Gulf streams	1	6	324	278	212,143	256	11,316	331	540,118	42
Canadian River	2	.....	.....	3	2,000	3	115	3	2,000	80
Red River	.....	2	2,500	46	47,750	58	3,380	60	50,260	81

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are shown in state bulletin on agriculture.]

	CROP.	AREA HARVESTED.					QUANTITY HARVESTED.				
		1919		1909		Per cent of increase.[1]	Unit.	1919		1909		Per cent of increase.[1]
		Acres.	Per cent of total for state.	Acres.	Per cent of total for state.			Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Corn	36,736	0.8	9,068	0.2	305.1	Bu.	1,207,132	1.1	191,474	0.3	530.4
2	Oats	3,494	0.2	2,496	0.6	40.0	Bu.	53,895	0.1	60,015	0.9	−10.2
3	Winter wheat	6,146	0.3	1,386	0.4	343.4	Bu.	90,535	0.2	26,681	1.1	239.3
	Other grains and seeds:											
4	Kafir, milo, etc.	6,310	0.4	1,154	0.2	446.8	Bu.	200,459	0.5	29,449	0.5	580.7
5	Dry beans, navy, etc.	694	7.6	(2)			Bu.	6,781	10.0	(2)		
	Hay and forage:											
6	Alfalfa	19,455	33.4	13,778	24.9	41.2	Tons.	55,544	40.5	43,771	44.7	26.9
7	Other tame or cultivated grasses	4,612	1.8	5,009	1.9	−7.9	Tons.	8,790	2.3	6,655	2.8	32.1
8	Small grains cut for hay	1,145	0.7	(2)			Tons.	1,244	0.6	(2)		
9	Wild, salt, or prairie grasses	699	0.4	593	0.3	16.4	Tons.	691	0.3	773	0.4	−10.6
10	Corn cut for forage	582	0.5	(2)			Tons.	631	0.9	(2)		
11	Kafir, sorghum, etc., for forage	11,817	0.8	(2)			Tons.	26,570	1.1	(2)		
	Vegetables:											
12	Potatoes (Irish or white)	553	2.0	961	2.7	−42.5	Bu.	35,317	2.1	90,089	4.0	−60.8
13	Sweet potatoes and yams	603	0.9	(2)			Bu.	59,223	1.0	(2)		
14	Cabbages	1,976	45.6	1,416	31.7	39.5						
15	Onions	942	15.1	1,842	35.6	−48.9						
16	Beans (green)	478	34.6	(2)								
17	Tomatoes	614	10.4	(2)								
	Miscellaneous:											
18	Rough rice	164,301	99.9	(2)			Bu.	5,297,169	99.8	(2)		
19	Broom corn	12,199	30.7	(2)			Lbs.	5,144,047	36.0	(2)		
20	Cotton	22,006	0.2	7,474	0.1	194.4	Bales.	8,537	0.3	2,299	0.1	271.3

	CROP.	AVERAGE YIELD PER ACRE, 1919.						VALUE.				
		Unit.	For state.	On non-irrigated land.	On irrigated land.			1919		1909		Per cent of increase.[1]
					Average.	Per cent of average for state.	Per cent of average on non-irrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Corn	Bu.	22.8	22.7	32.9	144.3	144.9	$1,629,028	1.1	$162,467	0.3	903.1
2	Oats	Bu.	34.3	34.4	15.4	44.8	44.8	43,116	0.1	38,068	1.0	11.5
3	Winter wheat	Bu.	15.1	15.1	14.7	97.4	97.4	187,407	0.2	23,408	0.8	700.6
	Other grains and seeds:											
4	Kafir, milo, etc.	Bu.	24.6	24.6	31.8	129.3	129.3	230,528	0.5	10,612	0.5	
5	Dry beans, navy, etc.	Bu.	7.4	7.2	9.8	132.4	136.1	29,836	10.0	(2)		
	Hay and forage:											
6	Alfalfa	Tons.	2.35	2.10	2.85	121.3	135.7	1,638,548	40.5	598,911	44.7	173.6
7	Other tame or cultivated grasses	Tons.	1.46	1.46	1.91	130.8	130.8	202,170	2.3	80,460	3.0	151.3
8	Small grains cut for hay	Tons.	1.15	1.15	1.09	94.8	94.8	29,856	0.6	(2)		
9	Wild, salt, or prairie grasses	Tons.	1.18	1.18	1.00	84.7	84.7	12,784	0.3	10,743	0.7	19.0
10	Corn cut for forage	Tons.	0.61	0.61	1.08	177.0	177.0	11,989	0.9	(2)		
11	Kafir, sorghum, etc., for forage	Tons.	1.65	1.65	2.25	136.4	136.4	504,830	1.1	(2)		
	Vegetables:											
12	Potatoes (Irish or white)	Bu.	62.6	62.6	63.9	102.1	102.1	79,441	2.1	81,052	4.4	−2.0
13	Sweet potatoes and yams	Bu.	85.7	85.6	98.2	114.6	114.7	106,601	1.0	(2)		
14	Cabbages							394,883	54.5	143,671	37.6	174.9
15	Onions							424,763	16.0	297,440	30.2	42.8
16	Beans (green)							74,620	43.6	(2)		
17	Tomatoes							176,800	14.6	(2)		
	Miscellaneous:											
18	Rough rice	Bu.	32.3	(3)	32.2	100.0	(3)	14,832,073	99.8	(2)		
19	Broom corn	Lbs.	359.4	331.8	421.7	117.3	127.1	257,202	36.0	(2)		
20	Cotton	Bales.	0.26	0.26	0.39	150.0	150.0	1,476,901	0.3	143,157	0.9	931.7

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not reported in 1909.
[3] Acreage too small to use as a base for a just average.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (−) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		THE STATE.	Atascosa.	Bailey.	Bexar.	Brazoria.	Brewster.	Cameron.[1]	Chambers.	Colorado.
1	Number of all farms in 1920	436,033	1,534	79	3,205	2,074	163	1,507	506	2,469
2	Number of farms irrigated in 1919	5,974	94	24	174	3	17	871	146	120
3	Per cent of all farms	1.4	6.1	30.4	5.4	0.1	10.4	57.8	28.9	4.9
4	Number of farms irrigated in 1909	5,238	.....	.....	175	9	.....	314	99	57
5	Per cent of increase, 1909–1919	14.1	.....	.....	−0.6	.....	.....	.....	.....	.....
	LAND AND FARM AREA.									
6	Approximate land area—acres	167,934,720	869,120	659,200	808,320	857,600	3,798,400	896,640	395,520	622,080
7	All land in farms—acres	114,020,621	379,206	352,142	576,218	303,037	1,772,086	299,279	179,430	457,296
8	Improved land in farms—acres	31,227,503	127,520	13,553	234,287	165,150	9,511	83,121	51,321	169,846
9	Area irrigated in 1919—acres	586,120	2,312	2,195	12,933	350	596	60,008	20,200	15,321
10	Per cent of improved land in farms	1.9	1.8	16.2	5.5	0.2	6.3	72.2	56.9	9.0
11	Area irrigated in 1909—acres	451,130	.....	.....	4,690	1,972	17	29,439	27,375	7,503
12	Per cent of increase, 1909–1919	29.9	.....	.....	175.8	−82.3	.....	.....	6.7	104.2
13	Area enterprises were capable of irrigating in 1920—acres	1,150,542	4,067	3,555	57,736	1,000	873	120,948	38,700	19,378
14	Area enterprises were capable of irrigating in 1910—acres	690,991	.....	.....	7,122	2,700	17	115,363	27,950	10,435
15	Per cent of increase, 1910–1920	66.5	.....	.....	710.7	−63.0	.....	.....	38.5	85.7
16	Area included in enterprises in 1920—acres	1,687,447	6,445	4,680	59,055	1,000	1,087	178,414	72,200	45,287
17	Area included in enterprises in 1910—acres	1,263,173	.....	.....	9,438	5,150	32	156,349	70,450	13,501
18	Per cent of increase, 1910–1920	34.7	.....	.....	525.7	−80.6	.....	.....	2.5	235.4
19	Area of irrigated land reported as available for settlement—acres	346,446	.....	.....	.....	.....	.....	50,568	.....	.....
	IRRIGATION WORKS.									
	Independent enterprises:									
20	Number, 1920	1,371	35	24	43	1	16	17	4	31
21	Number, 1910	2,772	.....	.....	36	8	.....	26	8	46
	Main ditches:									
22	Number, 1920	820	23	26	24	1	9	21	4	10
23	Number, 1910	861	.....	.....	10	6	3	32	5	18
24	Length, 1920—miles	1,524	44	24	53	2	6	140	55	36
25	Length, 1910—miles	1,479	.....	.....	30	7	1	153	41	22
26	Capacity, 1920—second-feet	23,261	25	50	1,702	1	132	3,435	865	523
27	Capacity, 1910—second-feet	12,818	.....	.....	1,153	.....	2	3,099	.....	.....
	Laterals:									
28	Number, 1920	2,022	34	52	44	.....	.....	92	24	39
29	Number, 1910	832	.....	.....	7	.....	1	112	28	11
30	Length, 1920—miles	2,949	16	26	74	.....	.....	456	66	42
31	Length, 1910—miles	1,224	.....	.....	6	.....	2	241	61	13
	Reservoirs:									
32	Number, 1920	368	21	.....	11	.....	16	3	1	1
33	Number, 1910	309	.....	.....	16	5	3	16	1	2
34	Capacity, 1920—acre-feet	392,999	46	.....	280,316	.....	15	1,501	25,000	.....
35	Capacity, 1910—acre-feet	74,361	.....	.....	6,364	1,565	2	32,964	61	.....
	Flowing wells:									
36	Number, 1920	135	40	.....	23	.....	1	.....	.....	.....
37	Number, 1910	123	.....	.....	21	.....	.....	2	.....	.....
38	Capacity, 1920—gallons per minute	62,364	16,540	.....	15,410	.....	60	.....	.....	.....
39	Capacity, 1910—gallons per minute	37,019	.....	.....	11,983	.....	.....	90	.....	.....
	Pumped wells:									
40	Number, 1920	901	10	27	22	.....	15	1	.....	39
41	Number, 1910	1,912	.....	.....	18	3	7	12	.....	65
42	Capacity, 1920—gallons per minute	538,565	7,700	24,150	10,820	.....	964	25	.....	25,850
43	Capacity, 1910—gallons per minute	567,126	.....	.....	11,207	2,600	114	5,175	.....	39,620
	Pumping plants:									
44	Number, 1920	1,369	11	24	31	1	15	23	7	44
45	Number, 1910	2,309	.....	.....	24	9	7	39	6	60
46	Engine capacity, 1920—horsepower	80,511	141	585	693	125	153	5,847	4,672	4,164
47	Engine capacity, 1910—horsepower	69,094	.....	.....	461	530	13	3,538	2,931	2,629
48	Pump capacity, 1920—gallons per minute	6,825,998	8,900	24,150	14,220	12,000	6,538	887,212	309,200	328,750
49	Pump capacity, 1910—gallons per minute	5,362,665	.....	.....	17,710	48,800	114	607,610	296,133	135,120
50	Average lift, 1920—feet	45	51	24	31	14	46	15	25	50
	CAPITAL INVESTED.									
51	Capital invested to Jan. 1, 1920—dollars	35,072,739	142,168	73,900	4,946,566	10,010	80,955	3,108,489	1,008,802	523,925
52	Capital invested to July 1, 1910—dollars	13,487,347	.....	.....	221,236	59,252	6,950	2,024,500	593,410	178,503
53	Per cent of increase, 1910–1920	160.0	.....	.....	.....	−83.1	.....	.....	70.0	193.5
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	30.48	34.96	20.79	85.68	10.01	92.73	25.70	26.07	27.04
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	19.52	.....	.....	31.06	21.95	408.82	17.55	21.23	17.11
	ESTIMATED FINAL COST.									
56	Estimated final cost of existing enterprises in 1920—dollars	39,860,871	146,218	73,900	5,446,566	10,010	90,655	4,098,489	1,008,802	523,925
57	Estimated final cost of existing enterprises in 1910—dollars	14,754,172	.....	.....	221,236	59,252	6,950	2,518,199	593,410	178,503
58	Per cent of increase, 1910–1920	170.2	.....	.....	.....	−83.1	.....	.....	70.0	193.5
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	23.62	22.69	15.79	92.23	10.01	83.40	22.97	13.97	11.57
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	11.77	.....	.....	23.44	11.51	217.19	16.11	8.42	13.22

[1] Part taken to form part of Willacy County in 1911.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		Deaf Smith.	Dimmit.	El Paso.[1]	Floyd.	Frio.	Galveston.	Hale.	Hardeman.	Harris.
1	Number of all farms in 1920	332	295	542	1,289	720	723	1,031	1,077	2,880
2	Number of farms irrigated in 1919	43	256	476	47	24	2	59	2	60
3	Per cent of all farms	11.3	86.8	87.8	3.6	3.3	0.3	5.7	0.2	2.1
4	Number of farms irrigated in 1909	.....	94	446	.....	.....	9	.....	2	90
5	Per cent of increase, 1909–1919	.....	.....	.....	.....	.....	.....	.....	.....	.....
	LAND AND FARM AREA.									
6	Approximate land area—acres	991,360	870,400	590,720	647,040	719,360	252,800	663,040	487,040	1,058,560
7	All land in farms—acres	603,073	207,885	217,367	490,731	581,407	102,332	581,713	366,152	379,262
8	Improved land in farms—acres	83,989	23,172	30,119	242,822	112,956	27,000	235,880	166,237	216,879
9	Area irrigated in 1919—acres	6,483	5,397	20,259	1,497	655	203	3,335	.....	8,009
10	Per cent of improved land in farms	7.7	23.3	67.3	0.6	0.6	0.7	1.4	.....	3.7
11	Area irrigated in 1909—acres	.....	3,327	23,308	.....	.....	2,500	5	4,040	25,795
12	Per cent of increase, 1909–1919	.....	62.2	.....	.....	.....	—91.9	.....	.....	—69.0
13	Area enterprises were capable of irrigating in 1920—acres	11,345	10,480	25,005	4,877	1,247	340	8,728	1,040	11,000
14	Area enterprises were capable of irrigating in 1910—acres	.....	5,618	25,324	.....	.....	3,195	5	4,040	26,760
15	Per cent of increase, 1910–1920	.....	86.5	.....	.....	.....	—89.4	.....	—74.3	—58.9
16	Area included in enterprises in 1920—acres	13,341	19,792	58,005	5,585	3,369	440	10,162	8,212	16,000
17	Area included in enterprises in 1910—acres	.....	9,934	35,287	.....	.....	3,985	5	5,075	27,980
18	Per cent of increase, 1910–1920	.....	99.2	.....	.....	.....	—89.0	.....	61.8	—42.8
19	Area of irrigated land reported as available for settlement—acres	.....	1,250	25,000	.....	.....	.....	.....	.....	.....
	IRRIGATION WORKS.									
	Independent enterprises:									
20	Number, 1920	43	146	2	47	24	2	58	2	1
21	Number, 1910	.....	76	63	.....	.....	6	.....	2	31
	Main ditches:									
22	Number, 1920	46	7	4	48	4	.....	64	2	1
23	Number, 1910	.....	37	21	.....	.....	5	.....	2	16
24	Length, 1920—miles	43	3	40	48	1	.....	52	8	5
25	Length, 1910—miles	.....	34	73	.....	.....	8	.....	11	21
26	Capacity, 1920—second-feet	94	30	774	94	10	.....	113	12	206
27	Capacity, 1910—second-feet	.....	197	2,327	.....	.....	.....	.....	60	.....
	Laterals:									
28	Number, 1920	141	2	.....	94	.....	.....	112	12	5
29	Number, 1910	.....	5	20	.....	.....	.....	.....	.....	11
30	Length, 1920—miles	70	2	.....	47	1	.....	56	.....	35
31	Length, 1910—miles	.....	4	44	.....	.....	.....	.....	.....	36
	Reservoirs:									
32	Number, 1920	.....	153	.....	.....	17	.....	1	2	.....
33	Number, 1910	.....	63	1	.....	.....	1	.....	2	3
34	Capacity, 1920—acre-feet	.....	1,690	.....	.....	23	.....	800	8,004	.....
35	Capacity, 1910—acre-feet	.....	295	2	.....	.....	1	.....	5	333
	Flowing wells:									
36	Number, 1920	2	27	.....	.....	4	.....	.....	.....	.....
37	Number, 1910	.....	42	.....	.....	.....	.....	.....	.....	.....
38	Capacity, 1920—gallons per minute	2,500	6,025	.....	.....	.....	.....	.....	.....	1
39	Capacity, 1910—gallons per minute	.....	17,368	.....	.....	1,500	.....	.....	.....	.....
	Pumped wells:									80
40	Number, 1920	44	178	.....	48	37	3	68	.....	.....
41	Number, 1910	.....	48	61	.....	.....	2	1	.....	36
42	Capacity, 1920—gallons per minute	46,250	48,450	.....	43,250	7,695	2,216	62,797	.....	.....
43	Capacity, 1910—gallons per minute	.....	24,760	37,190	.....	.....	6,000	50	.....	35,000
	Pumping plants:									
44	Number, 1920	43	181	.....	47	27	2	65	.....	1
45	Number, 1910	.....	52	65	.....	.....	6	1	.....	36
46	Engine capacity, 1920—horsepower	2,340	3,851	.....	1,950	306	82	3,212	.....	2,400
47	Engine capacity, 1910—horsepower	.....	692	878	.....	.....	695	5	.....	3,390
48	Pump capacity, 1920—gallons per minute	48,750	74,900	.....	43,250	8,045	2,216	62,985	.....	120,000
49	Pump capacity, 1910—gallons per minute	.....	30,712	46,240	.....	.....	27,100	50	.....	155,350
50	Average lift, 1920—feet	79	39	.....	91	63	41	76	.....	50
	CAPITAL INVESTED.									
51	Capital invested to Jan. 1, 1920—dollars	290,300	578,670	3,670,550	154,100	147,800	20,180	280,630	62,000	150,000
52	Capital invested to July 1, 1910—dollars	.....	243,078	282,590	.....	.....	72,476	125	75,850	848,600
53	Per cent of increase, 1910–1920	.....	138.1	.....	.....	.....	—72.2	.....	—18.3	—82.3
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	25.59	55.22	146.79	31.60	118.52	59.35	32.15	59.62	13.64
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	.....	43.27	11.16	.....	.....	22.68	25.00	18.77	31.71
	ESTIMATED FINAL COST.									
56	Estimated final cost of existing enterprises in 1920—dollars	290,300	611,720	5,310,550	154,100	149,300	20,180	280,630	62,000	150,000
57	Estimated final cost of existing enterprises in 1910—dollars	.....	243,078	282,590	.....	.....	72,476	125	75,850	848,600
58	Per cent of increase, 1910–1920	.....	151.7	.....	.....	.....	—72.2	.....	—18.3	—82.3
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	21.76	30.91	91.55	27.59	44.32	45.80	27.62	7.55	9.38
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	.....	24.47	8.01	.....	.....	18.19	25.00	14.95	30.33

[1] Parts taken to form Culberson County in 1911 and Hudspeth County in 1917.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		Hidalgo.[1]	Irion.	Jackson.	Jefferson.	Jeff Davis.	Kimble.	Kinney.	La Salle.	Liberty.
1	Number of all farms in 1920	1,727	136	1,485	419	62	372	98	280	1,314
2	Number of farms irrigated in 1919	1,131	64	45	274	18	68	9	65	12
3	Per cent of all farms	65.5	47.1	3.0	65.4	29.0	18.3	9.2	23.2	0.9
4	Number of farms irrigated in 1909	278	31	74	160	.....	59	16	58	5
5	Per cent of increase, 1909–1919	.....	.....	.....	71.3	.....	.....	.....	.....	.....
	LAND AND FARM AREA.									
6	Approximate land area—acres	1,042,560	638,720	571,520	568,800	1,448,320	832,640	839,680	999,040	742,400
7	All land in farms—acres	394,874	[2] 686,014	398,771	130,230	927,451	672,596	595,500	595,010	199,957
8	Improved land in farms—acres	99,822	7,604	126,961	93,435	1,085	26,143	13,066	40,401	73,449
9	Area irrigated in 1919—acres	160,532	2,133	6,074	74,002	1,210	290	1,844	2,531	13,500
10	Per cent of improved land in farms	160.8	28.1	4.8	79.2	111.5	1.1	14.1	6.3	18.4
11	Area irrigated in 1909—acres	21,048	1,511	11,167	75,983	186	2,297	3,359	2,165	1,030
12	Per cent of increase, 1909–1919	.....	41.2	—45.6	—2.6	550.5	—87.4	—45.1	16.9	.....
13	Area enterprises were capable of irrigating in 1920—acres	388,538	2,062	6,749	97,100	1,351	2,964	2,969	5,292	14,000
14	Area enterprises were capable of irrigating in 1910—acres	71,327	1,562	10,293	92,918	236	2,569	3,359	3,022	4,870
15	Per cent of increase, 1910–1920	.....	32.0	—34.4	4.5	472.5	15.4	—11.6	75.1	187.5
16	Area included in enterprises in 1920—acres	424,538	2,417	8,584	174,000	2,034	4,763	4,034	6,574	24,000
17	Area included in enterprises in 1910—acres	222,569	1,662	14,995	99,822	731	9,885	3,634	15,040	5,470
18	Per cent of increase, 1910–1920	.....	45.4	—42.8	74.3	178.2	—51.8	11.0	—58.0	338.8
19	Area of irrigated land reported as available for settlement—acres	29,000	.....	.....	11,100	.....	.....	1,450	.....	500
	IRRIGATION WORKS.									
	Independent enterprises:									
20	Number, 1920	9	15	44	18	12	52	6	38	2
21	Number, 1910	12	11	78	160	.....	32	15	54	7
	Main ditches:									
22	Number, 1920	10	24	10	19	9	37	5	2	2
23	Number, 1910	12	11	23	22	10	24	13	37	3
24	Length, 1920—miles	141	22	7	57	3	23	13	2	22
25	Length, 1910—miles	99	13	21	133	4	39	21	16	4
26	Capacity, 1920—second-feet	3,191	59	315	1,936	10	101	103	3	157
27	Capacity, 1910—second-feet	1,911	44	.....	.....	19	141	42	158	.....
	Laterals:									
28	Number, 1920	134	66	18	40	.....	5	269	.....	23
29	Number, 1910	146	1	6	29	16	27	31	.....	.....
30	Length, 1920—miles	765	15	9	89	.....	1	77	.....	36
31	Length, 1910—miles	173	2	2	154	1	17	14	.....	.....
	Reservoirs:									
32	Number, 1920	3	1	.....	1	8	2	.....	6	.....
33	Number, 1910	5	3	4	4	7	2	2	18	.....
34	Capacity, 1920—acre-feet	3,400	.....	.....	500	.....	5	.....	13	.....
35	Capacity, 1910—acre-feet	2,627	22	86	144	48	4	70	219	.....
	Flowing wells:								2	.....
36	Number, 1920	.....	.....	.....	.....	.....	.....	.....	2	.....
37	Number, 1910	.....	.....	.....	.....	.....	.....	.....	1,000	.....
38	Capacity, 1920—gallons per minute	.....	.....	.....	.....	.....	.....	.....	21	.....
39	Capacity, 1910—gallons per minute	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Pumped wells:									
40	Number, 1920	.....	1	48	.....	7	.....	.....	10	5
41	Number, 1910	3	.....	75	1	4	.....	2	.....	.....
42	Capacity, 1920—gallons per minute	.....	1,500	40,600	.....	3,180	.....	.....	760	45,500
43	Capacity, 1910—gallons per minute	81	.....	90,000	11	370	.....	30	.....	.....
	Pumping plants:								43	3
44	Number, 1920	10	12	44	19	11	37	2	53	7
45	Number, 1910	23	7	84	24	5	13	2	1,184	3,000
46	Engine capacity, 1920—horsepower	11,110	181	1,868	6,770	148	571	256	1,131	1,060
47	Engine capacity, 1910—horsepower	3,707	98	3,366	2,526	15	257	3	45,250	135,000
48	Pump capacity, 1920—gallons per minute	1,366,576	17,800	54,160	2,039,600	4,450	10,910	20,250	30,582	65,100
49	Pump capacity, 1910—gallons per minute	355,589	11,531	119,440	1,170,010	420	12,338	30	23	56
50	Average lift, 1920—feet	21	19	58	15	70	27	29	.....	.....
	CAPITAL INVESTED.									
51	Capital invested to Jan. 1, 1920—dollars	8,024,550	53,400	236,189	1,785,400	59,098	86,381	383,118	155,450	732,779
52	Capital invested to July 1, 1910—dollars	1,961,902	17,090	265,525	1,210,787	7,050	62,790	11,676	117,559	71,500
53	Per cent of increase, 1910–1920	.....	212.5	—11.0	47.5	738.3	37.6	.....	32.2	924.9
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	20.65	25.90	35.00	18.39	43.74	29.14	129.04	29.37	52.34
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	27.51	10.94	25.80	13.03	29.87	24.44	3.48	38.90	14.68
	ESTIMATED FINAL COST.									
56	Estimated final cost of existing enterprises in 1920—dollars	9,349,550	53,600	236,189	1,815,400	59,098	88,131	383,118	155,450	732,779
57	Estimated final cost of existing enterprises in 1910—dollars	2,342,318	17,090	265,525	1,210,787	7,050	62,790	11,676	117,559	71,500
58	Per cent of increase, 1910–1920	.....	213.6	—11.0	49.9	738.3	40.4	.....	32.2	924.9
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	22.02	22.18	27.52	10.43	29.06	18.50	94.97	23.65	30.53
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	10.52	10.28	17.71	12.13	9.64	6.35	3.21	7.52	13.07

[1] Parts taken to form parts of Brooks and Willacy Counties in 1911.

[2] The excess of farm acreage over approximate land area is due to the fact that the entire acreage of a farm is tabulated as in the county where the operator resides, even though part of the farm may be situated in an adjoining county.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.]

		Loving.	Matagorda.	Maverick.	Menard.	Orange.	Pecos.	Presidio.	Real.[1]	Reeves.	Runnels.
1	Number of all farms in 1920	14	1,616	66	308	311	207	102	200	206	2,023
2	Number of farms irrigated in 1919	7	126	36	85	115	134	31	37	153	18
3	Per cent of all farms	50.0	7.8	54.5	27.6	37.0	64.7	30.4	14.2	74.3	0.9
4	Number of farms irrigated in 1909	12	212	8	52	62	2	43	.....	63	.....
5	Per cent of increase, 1909–1919	.....	−40.6	.....	.....	.....	.....	.....	.....	.....	.....
	LAND AND FARM AREA.										
6	Approximate land area—acres	481,920	727,040	800,640	584,960	232,320	2,645,760	2,439,680	396,160	1,779,840	693,120
7	All land in farms—acres	172,323	406,587	131,521	512,431	64,872	2,331,822	1,212,914	359,814	1,050,716	531,469
8	Improved land in farms—acres	456	221,676	4,242	20,414	26,071	16,043	6,723	15,952	16,385	234,498
9	Area irrigated in 1919—acres	400	33,510	2,653	5,003	12,822	22,312	2,150	452	13,286	467
10	Per cent of improved land in farms	87.7	15.1	62.5	24.5	49.2	139.1	32.0	2.8	81.1	0.2
11	Area irrigated in 1909—acres	1,040	60,834	1,166	3,499	10,515	2,300	855	.....	13,986	372
12	Per cent of increase, 1909–1919	−61.5	−44.9	127.5	43.0	21.9	870.1	151.5	.....	−5.0	25.5
13	Area enterprises were capable of irrigating in 1920—acres	500	66,200	3,913	6,564	20,508	60,453	1,850	3,227	20,553	901
14	Area enterprises were capable of irrigating in 1910—acres	5,551	86,216	2,345	3,847	12,515	3,300	887	.....	17,378	463
15	Per cent of increase, 1910–1920	−91.0	−23.2	66.9	70.6	63.9	.....	108.6	.....	18.3	94.6
16	Area included in enterprises in 1920—acres	3,000	164,875	6,513	7,120	24,468	68,052	2,550	3,274	26,066	1,535
17	Area included in enterprises in 1910—acres	30,061	130,304	2,545	5,440	26,045	35,000	807	.....	44,858	515
18	Per cent of increase, 1910–1920	−90.0	26.5	155.9	30.9	−6.1	92.8	184.3	.....	−41.9	198.1
19	Area of irrigated land reported as available for settlement—acres	2,600	90,175	2,750	.....	8,588	28,580	300	.....	9,000	.....
	IRRIGATION WORKS.										
	Independent enterprises:										
20	Number, 1920	1	15	5	55	8	16	3	19	28	17
21	Number, 1910	4	37	7	19	11	2	9	.....	16	.....
	Main ditches:										
22	Number, 1920	1	20	7	27	9	18	6	21	24	13
23	Number, 1910	4	29	4	17	9	2	3	.....	12	3
24	Length, 1920—miles	2	111	5	28	42	135	13	24	53	5
25	Length, 1910—miles	9	114	3	21	28	13	3	.....	62	2
26	Capacity, 1920—second-feet	9	1,772	60	254	481	1,372	28	23	399	22
27	Capacity, 1910—second-feet	557	.....	24	145	.....	37	16	.....	207	4
	Laterals:										
28	Number, 1920	2	55	28	13	27	85	12	11	139	4
29	Number, 1910	4	86	3	2	21	9	6	.....	107	.....
30	Length, 1920—miles	1	105	32	428	33	212	5	7	47	1
31	Length, 1910—miles	7	142	1	4	27	11	2	.....	75	.....
	Reservoirs:										
32	Number, 1920	.....	1	.....	1	.....	3	.....	.....	1	5
33	Number, 1910	.....	3	.....	100	.....	56,000	1	.....	6,155	931
34	Capacity, 1920—acre-feet	.....	.....	.....	.....	.....	.....	1	.....	5,002	187
35	Capacity, 1910—acre-feet	.....	2	.....	.....	.....	9	.....	.....	5	.....
	Flowing wells:										
36	Number, 1920	.....	120	.....	.....	.....	7,200	.....	.....	1,850	.....
37	Number, 1910	.....	.....	.....	.....	.....	.....	.....	.....	600	.....
38	Capacity, 1920—gallons per minute	.....	8	.....	3	.....	1	.....	.....	22	.....
39	Capacity, 1910—gallons per minute	.....	14	.....	.....	2	.....	1	.....	7	32
	Pumped wells:										
40	Number, 1920	.....	8,700	.....	1,040	.....	1,200	.....	.....	16,465	.....
41	Number, 1910	.....	10,858	.....	.....	15,000	.....	7	.....	2,156	395
42	Capacity, 1920—gallons per minute	1	20	7	50	9	1	.....	1	17	16
43	Capacity, 1910—gallons per minute	2	42	4	15	11	.....	1	.....	10	40
	Pumping plants:										
44	Number, 1920	40	4,676	540	967	1,855	20	.....	3	459	262
45	Number, 1910	54	8,373	458	504	1,501	.....	1	.....	111	102
46	Engine capacity, 1920—horsepower	4,000	442,700	15,000	30,095	187,000	1,200	.....	250	18,065	9,850
47	Engine capacity, 1910—horsepower	8,700	915,600	18,250	27,350	208,700	.....	7	.....	5,556	4,077
48	Pump capacity, 1920—gallons per minute	15	26	50	24	14	42	.....	40	41	20
49	Pump capacity, 1910—gallons per minute										
50	Average lift, 1920—feet										
	CAPITAL INVESTED.										
51	Capital invested to Jan. 1, 1920—dollars	5,000	1,323,342	68,078	106,273	345,935	1,180,335	10,300	13,700	581,475	41,050
52	Capital invested to July 1, 1910—dollars	9,785	1,403,239	24,198	61,238	171,684	50,950	2,500	.....	211,910	10,040
53	Per cent of increase, 1910–1920	−48.9	−5.7	181.3	73.5	101.5	.....	312.0	.....	174.4	314.8
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	10.00	19.99	17.40	16.19	16.87	19.52	5.57	4.25	28.29	40.23
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	1.76	16.28	10.32	15.92	13.72	15.44	2.82	.....	12.19	21.68
	ESTIMATED FINAL COST.										
56	Estimated final cost of existing enterprises in 1920—dollars	5,000	1,323,942	68,078	108,273	348,935	1,298,535	10,300	13,700	587,575	41,850
57	Estimated final cost of existing enterprises in 1910—dollars	190,285	1,403,239	24,198	61,238	171,684	75,950	6,000	.....	211,910	10,040
58	Per cent of increase, 1910–1920	−97.4	−5.7	181.3	76.8	103.2	.....	71.7	.....	177.3	316.8
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	1.67	8.03	10.45	15.21	14.26	18.91	4.04	4.18	22.54	27.26
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	6.33	10.77	9.51	11.26	6.59	2.13	6.69	.....	4.72	19.50

[1] Organized from parts of Bandera, Edwards, and Kerr Counties in 1913.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.]

		San Saba.	Tom Green.	Uvalde.	Val Verde.	Ward.	Webb.	Wharton.	Zavalla.	All other counties.	Total for rice growing.
1	Number of all farms in 1920	1,268	680	706	285	238	257	2,967	239	397,911	.....
2	Number of farms irrigated in 1919	45	107	7	101	182	87	146	228	225	5,957
3	Per cent of all farms	3.5	15.7	1.0	35.4	76.5	33.9	4.9	95.4	0.1	.....
4	Number of farms irrigated in 1909	50	102	16	59	178	76	282	32	2,013	1,088
5	Per cent of increase, 1909–1919	.....	4.9	.....	.....	2.2	.....	−48.2	.....	−88.9	447.5
	LAND AND FARM AREA.										
6	Approximate land area (acres)	714,240	930,560	1,016,960	1,978,120	529,280	2,060,160	711,680	862,720	125,463,680	.....
7	All land in farms (acres)	570,216	750,663	1,222,589	1,699,287	349,476	971,850	438,068	655,164	88,049,730	.....
8	Improved land in farms (acres)	120,400	95,530	101,988	7,059	19,051	21,698	245,952	18,974	27,558,162	.....
9	Area irrigated in 1919 (acres)	95	7,103	484	2,475	20,000	7,480	19,516	1,642	3,410	212,498
10	Per cent of improved land in farms	0.1	7.4	0.5	35.1	105.0	34.5	7.9	8.7	(1)	.....
11	Area irrigated in 1909 (acres)	2,022	6,227	1,676	2,416	16,406	4,186	53,930	1,021	19,962	286,847
12	Per cent of increase, 1909–1919	−95.3	14.1	−71.1	2.4	21.9	78.7	−63.8	60.8	−82.9	−25.9
13	Area enterprises were capable of irrigating in 1920 (acres)	2,221	10,040	2,032	3,550	37,000	13,143	40,623	4,645	11,275	315,598
14	Area enterprises were capable of irrigating in 1910 (acres)	2,379	6,703	1,676	4,036	28,712	5,625	63,613	1,818	25,242	350,350
15	Per cent of increase, 1910–1920	−6.6	49.8	21.2	−12.0	28.9	133.7	−36.1	155.5	−55.3	−9.9
16	Area included in enterprises in 1920 (acres)	2,395	14,718	2,032	4,660	71,500	31,736	75,612	5,933	16,789	606,466
17	Area included in enterprises in 1910 (acres)	3,135	7,372	4,380	4,036	105,012	10,677	91,632	3,440	35,630	499,474
18	Per cent of increase, 1910–1920	−23.6	99.6	−53.6	15.5	−31.9	197.2	−17.5	72.5	−52.9	21.4
19	Area of irrigated land reported as available for settlement (acres)	.....	.....	.....	2,125	49,600	.....	31,000	.....	1,900	.....
	IRRIGATION WORKS.										
	Independent enterprises:										
20	Number, 1920	31	50	5	2	3	58	138	36	189	264
21	Number, 1910	38	30	17	5	6	62	199	19	1,620	611
	Main ditches:										
22	Number, 1920	18	54	4	3	4	20	29	19	111	105
23	Number, 1910	32	20	12	9	7	57	78	11	242	225
24	Length, 1920 (miles)	10	53	9	11	61	12	45	8	47	352
25	Length, 1910 (miles)	19	43	11	22	65	54	125	9	120	538
26	Capacity, 1920 (second-feet)	30	348	18	408	925	1,666	1,076	35	325	7,392
27	Capacity, 1910 (second-feet)	280	110	67	160	1,306	105	.....	44	453	.....
	Laterals:										
28	Number, 1920	13	92	1	13	9	51	25	86	150	256
29	Number, 1910	4	10	12	21	12	.....	21	.....	57	216
30	Length, 1920 (miles)	3	25	.....	10	52	6	41	12	40	456
31	Length, 1910 (miles)	1	9	5	13	68	.....	57	.....	32	502
	Reservoirs:										
32	Number, 1920	.....	11	.....	.....	.....	45	1	18	35	5
33	Number, 1910	4	2	.....	1	.....	9	1	9	109	21
34	Capacity, 1920 (acre-feet)	.....	6,750	.....	.....	.....	20,248	100	65	1,334	25,603
35	Capacity, 1910 (acre-feet)	307	1,320	.....	1	.....	196	120	90	22,325	2,310
	Flowing wells:										
36	Number, 1920	.....	.....	.....	.....	.....	.....	1	8	11	3
37	Number, 1910	.....	.....	.....	.....	.....	.....	.....	11	42	1
38	Capacity, 1920 (gallons per minute)	.....	.....	.....	.....	.....	.....	1,000	1,000	8,159	1,120
39	Capacity, 1910 (gallons per minute)	.....	.....	.....	.....	.....	.....	.....	3,500	3,377	80
	Pumped wells:										
40	Number, 1920	.....	7	1	.....	.....	9	192	37	73	290
41	Number, 1910	1	1	4	1	7	.....	278	6	1,205	500
42	Capacity, 1920 (gallons per minute)	.....	632	50	.....	.....	2,975	160,817	7,942	13,297	238,183
43	Capacity, 1910 (gallons per minute)	15	45	180	60	2,714	.....	150,000	4,750	82,477	445,495
	Pumping plants:										
44	Number, 1920	32	48	2	.....	.....	68	173	37	184	323
45	Number, 1910	32	23	3	1	7	15	268	10	1,302	575
46	Engine capacity, 1920 (horsepower)	616	1,105	20	.....	.....	3,885	6,531	809	3,114	36,143
47	Engine capacity, 1910 (horsepower)	675	573	58	8	66	2,860	12,346	249	6,240	48,179
48	Pump capacity, 1920 (gallons per minute)	16,570	57,020	410	.....	.....	86,950	185,442	20,692	105,042	3,816,068
49	Pump capacity, 1910 (gallons per minute)	23,908	38,199	1,700	60	2,714	87,341	625,797	11,350	252,477	3,907,380
50	Average lift, 1920 (feet)	40	29	38	.....	.....	72	38	91	39	40
	CAPITAL INVESTED.										
51	Capital invested to Jan. 1, 1920 (dollars)	117,256	401,194	28,550	275,000	370,000	1,098,640	1,543,808	160,850	635,943	7,680,370
52	Capital invested to July 1, 1910 (dollars)	49,527	97,732	16,149	122,138	780,382	263,312	889,174	49,456	941,484	6,140,639
53	Per cent of increase, 1910–1920	136.8	310.5	76.8	125.2	−52.6	317.2	73.6	225.2	−32.5	25.1
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920 (dollars)	52.79	39.96	14.05	77.46	10.00	83.59	38.00	34.63	56.40	24.34
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910 (dollars)	20.82	14.58	9.64	30.26	27.18	46.81	13.98	27.20	37.30	17.53
	ESTIMATED FINAL COST.										
56	Estimated final cost of existing enterprises in 1920 (dollars)	117,271	402,194	28,550	315,000	370,000	1,139,702	1,574,608	160,850	645,848	7,744,770
57	Estimated final cost of existing enterprises in 1910 (dollars)	49,527	97,732	16,149	122,138	950,382	263,312	889,174	49,456	955,194	6,140,639
58	Per cent of increase, 1910–1920	136.8	311.5	76.8	157.9	−61.1	332.8	77.1	225.2	−32.4	26.1
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920 (dollars)	48.96	27.33	14.05	67.60	5.17	35.91	20.82	27.11	38.47	12.77
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910 (dollars)	15.80	13.26	3.69	30.26	9.05	24.66	9.70	14.38	26.81	12.29

[1] Less than one-tenth of 1 per cent.

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FOURTEENTH CENSUS OF THE UNITED STATES: 1920

DEPARTMENT OF COMMERCE

BULLETIN

BUREAU OF THE CENSUS

IRRIGATION : UTAH

STATISTICS FOR THE STATE AND ITS COUNTIES

Prepared under the supervision of WILLIAM LANE AUSTIN, Chief Statistician for Agriculture, by R. P. TEELE, Special Agent in Charge of Irrigation

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INTRODUCTION.

This bulletin presents the statistics of irrigation for the state of Utah collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the bulletin figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

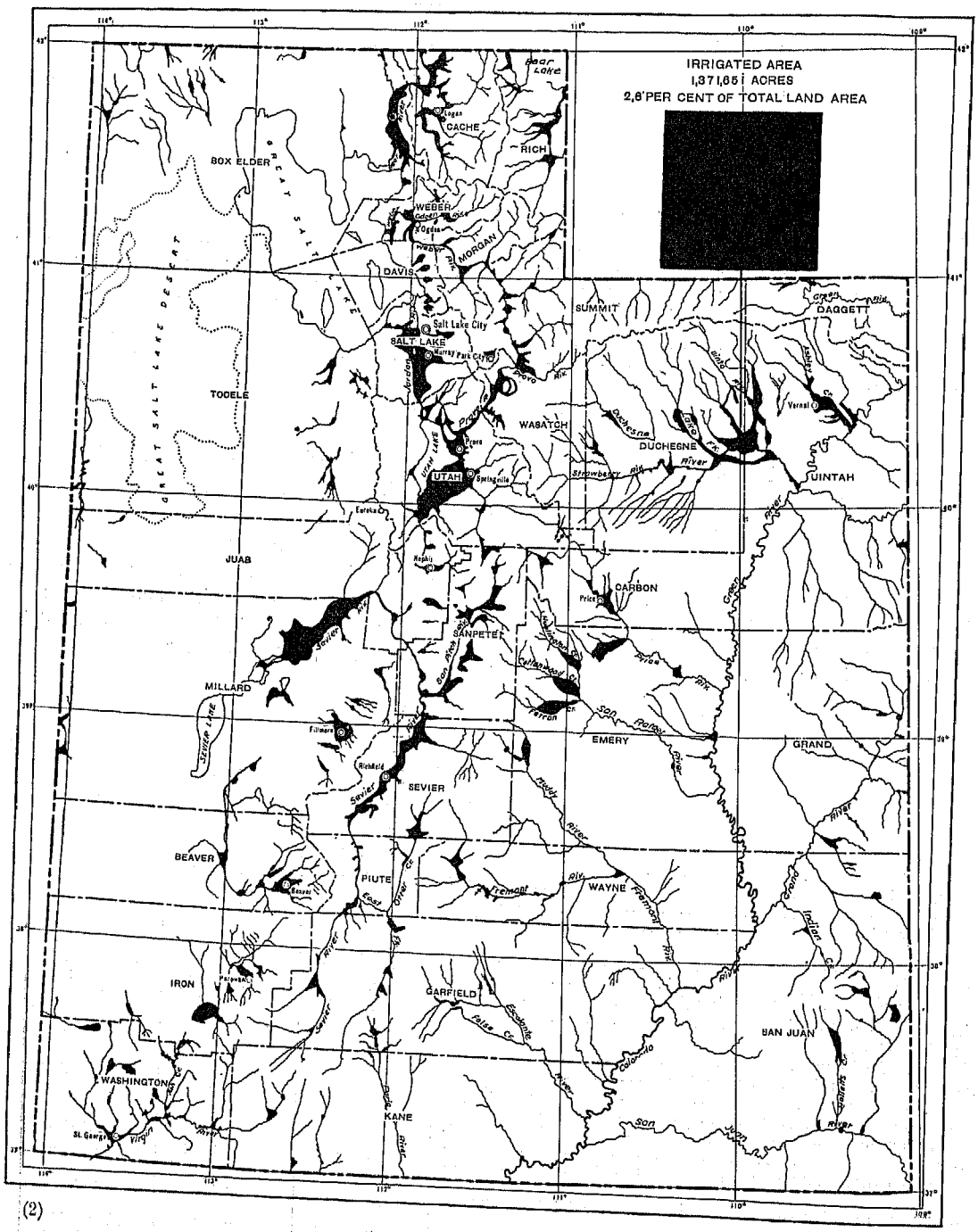
ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	25,662	21,676	3,986	18.4
Approximate land area of the state.....acres	52,597,760	52,597,760		
All land in farms.....acres	5,050,410	3,397,699	1,652,711	48.6
Improved land in farms.....acres	1,715,380	1,368,211	347,169	25.4
Number of farms irrigated	22,218	19,709	2,509	12.7
Area irrigated.....acres	1,371,651	999,410	372,241	37.2
Area enterprises were capable of irrigating.....acres	1,700,550	1,250,246	450,304	36.0
Area included in enterprises.....acres	2,359,244	1,947,625	411,619	21.1
Per cent irrigated:				
Number of all farms	86.6	90.9	−4.3	
Approximate land area of the state.....acres	2.6	1.9	0.7	
Land in farms.....acres	27.2	29.4	−2.2	
Improved land in farms.....acres	80.0	73.0	7.0	
Excess of area enterprises were capable of irrigating over area irrigated.....acres	328,899	250,836	78,063	31.1
Excess of area included in enterprises over area irrigated.....acres	658,694	948,215	−289,521	−30.5
Area of irrigated land reported as available for settlement.....acres	189,563	(2)	189,563	
Capital invested	$32,037,351	$14,028,717	$18,008,634	128.4
Average per acre enterprises were capable of irrigating	$18.84	$11.22	$7.62	67.9
Estimated final cost of existing enterprises	$33,835,641	$17,840,775	$15,994,866	89.7
Average per acre included in enterprises	$14.34	$9.16	$5.18	56.6
Average cost of operation and maintenance per acre	$1.08	$0.65	$0.43	66.2

[1] A minus sign (−) denotes decrease.

[2] Not reported in 1910.

UTAH

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.



EXPLANATION OF TERMS.

Farms irrigated.—The number of "farms irrigated" is the number on which irrigation is practiced, and for the purposes of this inquiry a "farm" is defined as for the general census of agriculture; that is, to be classed as a farm an establishment either must be 3 acres in extent or must have produced crops to the value of $250 in 1919, or must have required for its agricultural operations the continuous services of at least one person. "Number of farms irrigated" as used in this report and in that of 1910, is equivalent to the term "number of irrigators" used in census reports on irrigation previous to 1910.

Irrigation enterprise.—An "enterprise" is an independent irrigation establishment and includes the works for supplying water and the land to which water is supplied or is to be supplied, except that the cost or value of the land is not included in the "capital invested."

Acreage irrigated, in enterprises, and available for settlement.—Acreage irrigated is the acreage to which water was actually applied in the season preceding the census year—1919 for the Fourteenth Census and 1909 for the Thirteenth Census.

Acreage to which enterprises were capable of supplying water relates to the season following the time of taking the census and, consequently, is based on estimates made by those controlling the enterprises.

Acreage included in enterprises represents the extent of the plans of those controlling enterprises.

Acreage of irrigated land reported as available for settlement relates to land within existing enterprises and not to land that is susceptible of reclamation and settlement by new enterprises or extensions of existing enterprises.

Types of enterprises.—The types of enterprises under which all data are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands. In addition to serving land within its own projects, the United States Reclamation Service supplies stored water to land within other enterprises.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who may own no interest in the works.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization.

Capital invested.—The capital invested in irrigation enterprises is that reported by the owners. For the larger works the capital invested is taken, in most cases, from books of account and represents the actual investment. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the capital reported represents the owners' estimates. The schedules used in 1910 called for "cost," while the schedule used in the present census calls for "capital invested," but the instructions accompanying the schedules make these two terms equivalent. In both cases the investment includes cost of construction and of acquiring rights. The latter usually consists of filing fees only, but in some instances it includes the purchase price of rights. However, these cases are so rare that they are unimportant. The cost reported for 1900 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. For the Thirteenth and Fourteenth Censuses the average cost per acre is based on the acreage which enterprises were capable of irrigating in the census year and the cost to the date of the census—January 1, 1920, for the Fourteenth Census, and July 1, 1910, for the Thirteenth Census.

Operation and maintenance.—Cost of operation and maintenance was not reported on all schedules, and averages are based on the acreages for which cost is reported. No estimate of total cost of operation and maintenance for all irrigation enterprises has been made. In the case of enterprises operating pumping plants the cost of operation and maintenance includes cost of fuel and attendance.

Water rights.—The acreage irrigated has been classified by the character of rights under which water is received. The classes used are defined as follows:

"*Appropriation and use*" includes all rights acquired without formalities of any kind that have not been defined by the courts.

"*Notice filed and posted*" includes rights for which claims of some kind have been either posted or filed that have not been defined by the courts.

"*Adjudicated by court*" includes all rights that have been defined by the courts.

"*Permit from state*" includes all rights initiated under laws requiring any party wishing to acquire rights to obtain a permit from the state.

"*Certificate or license from the state*" includes rights acquired under laws providing for the issuing by the state of certificates or licenses defining rights acquired.

"*Riparian rights*" includes rights based on the ownership of riparian land.

"*Underground*" represents water taken from wells.

Source of water supply.—In classifying acreage by source of supply from which water for irrigation is obtained, in 1910 acreage was credited to what seemed to be the principal source of supply, while in the census of 1920 the attempt is made to represent the facts more nearly by presenting various mixed classes.

Date of beginning.—The date of beginning of irrigation enterprises is, in some cases, the date when construction began, and, in other cases, the date of filing a claim or of applying for a permit. If a filing or application for permit was made and work was begun and continued with reasonable diligence the date of filing is considered the date of beginning, otherwise the date of construction is taken as the date of beginning.

Drainage basin.—The drainage basin of a stream is all of the land drained by the stream and its tributaries.

Units of quantity and capacity.—Capacities of canals, reservoirs, wells, pumps, and engines, and quantities of water used are expressed in the units commonly used in engineering literature to express the same items. They are as follows:

Capacities of canals and volumes of flowing water are given in second-feet, a shorter equivalent for cubic feet per second.

Capacities of wells and pumps are given in gallons per minute. Four hundred and fifty gallons per minute equal 1 second-foot.

Capacities of reservoirs are given in acre-feet. An acre-foot is the quantity of water that will cover 1 acre to a depth of 1 foot. It equals 43,560 cubic feet.

Capacities of engines and motors are given in horsepower. One horsepower is the power required to lift 33,000 pounds through a vertical distance of 1 foot in 1 minute of time.

CLIMATIC CONDITIONS.

The climatic conditions determining the necessity for irrigation are the amount and seasonal distribution of precipitation, especially rainfall, and, to a lesser extent, temperature and wind movement.

The surface of the central, eastern, and southern parts of the state is mountainous, with high plateaus and stream valleys interspersed between the ranges of mountains. The west central and northwestern parts of the state lie within the Great Basin, the bed of the ancient Lake Bonneville, and here the surface consists of extensive level plains, with occasional small ranges of mountains and hills or isolated peaks.

The whole state may be classed as arid, since only on the high mountains does the annual precipitation amount to 20 inches.

On the Wasatch and Uinta Mountains in the north central part of the state and on the divide between Virgin River and the Great Basin in the southwestern part of the state the annual precipitation exceeds 20 inches.

Immediately surrounding each of these sections lies a belt that receives from 15 to 20 inches of precipitation annually, and beyond that is a zone receiving from 10 to 15 inches. About one-third of the area of the state, divided about equally between the west central and the eastern parts of the state, receives less than 10 inches of precipitation annually, and in the Great Salt Lake Desert the annual precipitation is less than 5 inches.

In all of the valleys of the state the land slopes up from the central drainage channels toward the mountains, and the rainfall on the higher lands near the mountains is greater than that in the valleys, and on the higher lands crops, especially the cereals, are grown without irrigation. It is very common for farmers to have home farms on which crops are grown under irrigation and additional land above the canals on which crops are grown without irrigation.

Throughout the state the precipitation is fairly well distributed throughout the year, although it is slightly heavier in the winter than in the summer, the snowfall in the mountains being heavy and remaining well into the summer.

Precipitation in 1919 was much below the normal, and this condition was aggravated by a great deficiency in the summer months, that was offset to some extent by heavy rains in the fall. The drought was felt to some extent in May, but was much more pronounced in June and July, being accompanied by low humidities and high wind movement. Pastures, ranges, and dry-land crops suffered severely, and in many places irrigation water became scarce. On the whole, the season was unfavorable to the production of the best crops, although the fall rains helped late crops.

WATER SUPPLY FOR IRRIGATION.

The area of the state of Utah is about equally divided between the drainage basin of Colorado River and its tributaries and the great interior basin, which has no outlet to the sea. The eastern and extreme southern parts of the state are drained by the Colorado and its tributaries, while the northern and western parts of the state are within the Great Basin.

Green and Grand Rivers unite to form Colorado River in the southeastern part of Utah. Green River rises in northwestern Wyoming, enters Utah from Wyoming, flows across the northeastern corner of Utah, makes a short loop in Colorado, and returns to Utah. It flows in a southerly direction through eastern Utah roughly parallel to the eastern boundary and receives tributaries from Colorado on the east and from the Wasatch Mountains on the west. Green River itself flows in deep canyons most of its course in Utah, and the same is true of its tributaries from the east. Its principal tributaries from the west—Duchesne and Price Rivers—flow through large valleys and are utilized to a considerable extent for irrigation.

Grand River enters Utah from Colorado about midway of the eastern boundary of the state, and Colorado River leaves the state about midway of the southern boundary of the state. Both of these streams flow in deep canyons and are not used for irrigation to any considerable extent, although they carry large volumes of water.

Virgin River, a tributary of Colorado River, provides a small supply of water for irrigation in the southwestern corner of the state.

The larger part of the irrigated land of the state lies in the Great Salt Lake drainage basin, the water supply coming principally from streams draining the Wasatch and Uinta Mountains and flowing into Utah Lake and Great Salt Lake. Of these Bear River rises in the Uinta Mountains in Utah, flows north into Wyoming, crosses and recrosses from Wyoming into Utah, makes a loop into Idaho, returns to Utah, and discharges into the northern end of Great Salt Lake. It is used for irrigation to some extent throughout its course and supplies a large area in northern Utah. Its tributaries also serve considerable areas.

From the Wasatch Mountains many short streams flow into Great Salt Lake and Utah Lake, and these water the older irrigated areas of the state.

Southwest of the Great Salt Lake drainage basin lies the drainage basin of Sevier River, and other streams that rise in the high lands of southern Utah, and flow out into the deserts and discharge into lakes or are lost.

In most of the valleys of the state artesian water is found and is used for irrigation, and in the valleys of the Great Basin there appears to be much ground water that can be obtained by pumping.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	22,218	12.7	86.6	1,371,651	37.2	2.6	27.2	80.0
1910	19,709	10.0	90.9	999,410	58.8	1.9	29.4	73.0
1900	17,924	84.3	92.5	629,293	138.8	1.2	15.3	61.0
1890	9,724	.....	92.5	263,473	.....	0.5	20.0	48.1

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of area in enterprises.	
Total	2,403	2,359,244	1,371,651	100.0	1,700,550
Before 1860	157	131,071	100,132	7.7	118,938
1860-1869	256	165,414	144,957	10.6	150,010
1870-1879	208	247,868	201,840	14.7	222,904
1880-1889	389	474,560	300,415	21.9	334,883
1890-1899	206	184,057	113,386	8.3	125,078
1900-1904	127	124,505	81,407	5.9	91,590
1905-1909	171	551,485	250,048	18.2	404,876
1910-1914	179	257,123	67,466	4.9	121,504
1915-1919	205	149,259	44,939	3.3	64,172
Not reported	355	73,836	61,061	4.5	66,595

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	1,371,651	999,410	372,241	37.2	1,700,550	2,359,244
Stream, gravity	1,105,691	954,800	150,891	15.8	1,380,171	1,917,751
Stream, pumped	10,389	2,559	7,830	306.0	16,575	76,187
Stream, pumped and gravity	50	(2)	.....	.....	200	350
Wells, pumped	7,308	300	7,008	.....	12,941	19,593
Wells, flowing	4,908	4,100	808	19.7	5,706	19,252
Wells, flowing and pumped	178	(2)	.....	.....	261	331
Lake, pumped	11,400	.....	.....	.....	19,000	24,400
Lake, gravity	15,218	1,671	13,547	810.7	16,185	17,285
Springs	41,310	35,412	5,898	16.7	45,126	60,378
Stored storm water	977	568	409	72.0	1,620	2,330
City water	25	(2)	.....	.....	25	25
Stream, gravity, and pumped wells	125	(2)	.....	.....	233	233
Stream, gravity, and flowing wells	537	(2)	.....	.....	595	793
Other mixed	173,495	(2)	.....	.....	201,841	229,324
Other and not reported	40	(2)	.....	.....	71	102

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF ENTERPRISE.

Utah enacted the original irrigation district law in the United States in 1865, which did not, however, contain the provision for issuing bonds, which is the most important feature of present-day irrigation district laws. Many districts were organized under this law, but they were short-lived. A district law providing for the issuing of bonds was enacted in 1909, but little has been done under this law. Some of the land served by the United States Reclamation Service has been organized into irrigation districts, but this land is credited to the Reclamation Service in Table 5, because the Government built the works and still controls them to a large extent. The Reclamation Service also supplies stored water to land in other enterprises under the terms of the Warren Act (act of Congress, Feb. 21, 1911) and under special agreements.

The state of Utah accepted the terms of the Federal Carey Act (act of Congress, Aug. 18, 1894) in 1897, but little has been done under this act.

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
ACREAGE IRRIGATED.				
Total	1,371,651	999,410	372,241	37.2
Individual and partnership	166,887	222,448	−55,561	−25.0
Cooperative	1,014,649	687,260	327,389	47.6
Irrigation district	21,143	8,455	12,688	150.1
Carey Act	16,000	5,000	11,000	220.0
Commercial	70,911	64,727	6,184	9.6
U. S. Reclamation Service	[2] 29,285	.....	29,285	.....
U. S. Indian Service	25,270	11,520	13,750	119.4
City	24,206	(3)	24,206	.....
Other	3,300	(3)	3,300	.....
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	1,700,550	1,250,246	450,304	36.0
Individual and partnership	195,858	257,266	−61,408	−23.9
Cooperative	1,225,084	790,855	434,229	54.9
Irrigation district	24,023	8,455	15,568	184.1
Carey Act	35,000	20,000	15,000	75.0
Commercial	91,833	87,070	4,763	5.5
U. S. Reclamation Service	[2] 50,030	.....	50,030	.....
U. S. Indian Service	49,870	86,600	−36,730	−42.4
City	25,552	(3)	25,552	.....
Other	3,300	(3)	3,300	.....
ACREAGE INCLUDED IN ENTERPRISES.				
Total	2,359,244	1,947,625	411,619	21.1
Individual and partnership	261,720	376,502	−114,782	−30.5
Cooperative	1,736,863	1,259,351	477,512	37.9
Irrigation district	27,933	10,802	17,131	158.6
Carey Act	38,000	43,000	−5,000	−11.6
Commercial	147,933	151,970	−4,037	−2.7
U. S. Reclamation Service	[2] 60,030	.....	60,030	.....
U. S. Indian Service	55,870	106,000	−50,130	−47.3
City	27,595	(3)	27,595	.....
Other	3,300	(3)	3,300	.....

[1] A minus sign (−) denotes decrease.
[2] Does not include about 23,000 acres to which stored water is supplied under Warren Act.
[3] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of Utah relating to water rights are summarized in the following paragraphs:

The organic act of the territory of Utah, enacted in 1851, did not mention the subject of irrigation, but the territorial legislature disposed of water rights by direct grant and also delegated this power to the county courts of the several counties. Many such grants were made both by the legislature and by the county courts in some counties.

The act of February 20, 1880, provided for the recording of vested rights to the use of water and for regulating their exercise. The county selectmen were made water commissioners for their respective counties and were empowered to hear and determine all claims to the use of water, and to issue certificates showing their findings. No suits were to be maintained in the courts until the commissioners had acted, but appeal might be taken to the courts.

The constitution of the state of Utah, adopted in 1896, declares (Art. XVII) that "all existing rights to any waters of this state for any useful or beneficial purpose are hereby recognized and confirmed."

The act of March 11, 1897, provided that any party desiring to appropriate water should post a notice at the intended point of diversion and in the nearest post office and should file a copy of the notice in the county records.

The act of March 12, 1903, provided that parties wishing to appropriate water should apply to the state engineer for permits, and for the issuing of certificates by the state engineer when works have been completed and water used in accordance with the terms of the permits.

The same act provided a special procedure for the adjudication of water rights. The state engineer was to make surveys and collect information regarding rights, and submit reports to the appropriate district courts. The courts were to determine rights on the basis of these reports and any testimony they might take. This act is still in force, but has not been utilized to any large extent. Many rights have been adjudicated in ordinary suits between claimants.

Riparian rights are not recognized in Utah.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.
	Acres.	Per cent of total.	
Total	1,371,651	100.0	100.0
Appropriation and use	469,944	34.3	51.5
Notice filed and posted	171,955	12.5	6.2
Adjudicated by court	581,080	42.4	35.1
Permit from state	56,061	4.1	3.9
Certificate or license from state	66,778	4.9	3.2
Underground	8,631	0.6	(1)
Other and mixed	4,077	0.3	(1)
Not reported	13,125	0.9	(1)

[1] This class was not included in the tabulation for 1909. All land for which class of water rights was not reported was included in "Appropriation and use."

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributaries were included in those reported for the main streams. This area is so small, however, that the comparison of the areas reported for the tributary streams is not seriously affected.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres)
	1919	1902	Per cent of increase.[1]		
Total	1,371,651	713,621	92.2	2,359,244	1,700,55
Tributaries of Great Salt Lake	570,868	402,406	41.9	836,075	660,28
Bear River and tributaries	202,681	141,616	43.1	272,100	218,03
Bear River direct	104,731	48,590	115.7	161,328	117,52
Little Bear River	46,541	38,592	20.6	48,358	46,80
Malad River	1,189	(2)	.....	1,935	1,18
Other tributaries of Bear River	50,220	[3] 54,404	−7.8	60,479	52,43
Weber River and tributaries	97,589	80,355	21.4	149,081	112,981
Weber River direct	44,726	41,967	6.6	83,796	49,341
Ogden River	21,884	22,373	−2.2	27,097	23,852
East Canyon Creek	6,202	4,414	40.5	6,538	6,468
Other tributaries of Weber River	24,777	[3] 11,601	113.6	31,650	30,320
Jordan River and Utah Lake and tributaries	270,598	180,435	50.0	414,894	328,265
Jordan River direct	48,052	32,401	48.3	90,495	55,720
Big Cottonwood Creek	10,991	8,813	24.7	13,207	12,271
Little Cottonwood Creek	12,144	7,673	58.3	16,098	16,091
American Fork River	19,146	20,446	−6.4	20,371	20,241
Provo River	54,782	36,939	48.3	62,703	50,672
Hobble Creek	5,620	18,424	−69.5	6,589	5,946
Spanish Fork River	61,434	23,778	158.4	96,176	83,142
Other tributaries of Jordan River and Utah Lake	58,429	[3] 31,961	82.8	108,655	78,582
Sevier River and tributaries	325,718	131,048	148.5	630,484	402,387
Sevier River direct	153,651	59,257	159.3	351,553	220,190
San Pitch River	77,616	42,502	82.6	105,519	78,348
Otter Creek	7,289	5,260	38.6	7,845	7,289
South Fork	18,325	3,495	424.3	32,020	19,170
Other tributaries of Sevier River	68,837	[3] 20,534	235.2	132,047	71,381
Green River and tributaries	280,877	53,934	420.8	510,426	385,612
Green River direct	2,541	1,372	85.2	3,629	3,038
Ashley Fork River	26,787	15,834	69.2	44,087	44,087
Duchesne River	138,440	(2)	.....	322,689	217,809
Price River	23,811	6,621	259.6	37,191	24,848
San Rafael River	77,290	21,546	258.7	85,028	80,028
Other tributaries of Green River	12,002	[3] 8,561	40.2	17,802	15,802
Grand River and tributaries	9,740	[3] 3,843	153.4	24,615	18,529
Colorado River and tributaries	71,959	34,845	106.5	171,054	92,850
Fremont River	26,513	15,701	68.9	42,005	34,005
Virgin River	27,106	10,741	152.4	82,450	35,586
San Juan River	9,554	(2)	.....	26,646	14,158
Other tributaries of Colorado River	8,786	[3] 8,403	4.6	19,953	9,101
Independent streams	112,489	87,545	28.5	186,590	140,889
Beaver River	28,732	15,599	84.2	53,729	46,469
Coal Creek	27,206	2,845	856.3	66,891	33,893
Deep Creek	1,983	1,515	30.9	4,326	3,446
Grouse Creek	3,469	990	250.4	4,599	3,639
Other independent streams	51,099	[3] 66,596	−23.3	63,045	53,442

[1] A minus sign (−) denotes decrease.
[2] Included in "Other tributaries" in 1902.
[3] Includes springs and wells.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.[1]
1920	$32,037,351	128.4	$18.84	67.9
1910	14,028,717	139.2	11.22	20.4
1900	5,865,302	111.0	9.32	−11.7
1890	2,780,000	.....	10.55	.....

[1] A minus sign (−) denotes decrease.

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$32,037,351	100.0	$18.84
Before 1860	1,883,033	5.9	15.84
1860–1869	1,639,304	5.1	10.93
1870–1879	2,495,342	7.8	11.19
1880–1889	4,728,282	14.8	14.12
1890–1899	2,333,321	7.3	18.65
1900–1904	807,149	2.5	8.81
1905–1909	10,322,803	32.2	25.50
1910–1914	5,113,678	16.0	42.09
1915–1919	1,863,298	5.8	29.04
Not reported	850,451	2.6	12.77

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$32,037,351	100.0	$18.84	1,122,456	$1.08
Stream, gravity	26,503,402	82.7	19.20	910,594	1.01
Stream, pumped	733,077	2.3	44.23	7,444	5.16
Stream, pumped and gravity	5,100	(2)	25.50	.....	.....
Wells, pumped	153,091	0.5	11.83	6,212	2.08
Wells, flowing	167,152	0.5	29.29	756	1.79
Wells, flowing and pumped	18,571	0.1	71.15	27	9.48
Lake, pumped	565,000	1.8	29.74	26,400	3.58
Lake, gravity	75,281	0.2	4.65	13,877	0.25
Springs	869,214	2.7	19.26	25,858	0.75
Stored storm water	81,803	0.3	50.50	857	2.23
City water	800	(2)	32.00	.....	.....
Stream, gravity, and pumped wells	22,000	0.1	94.42	85	2.94
Stream, gravity, and flowing wells	11,822	(2)	19.87	203	0.49
Other mixed	2,828,242	8.8	14.01	130,126	0.94
Other and not reported	2,736	(2)	38.54	17	1.76

[1] Based on area irrigated in 1919.
[2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.[1]	
			Amount.	Per cent.
Total	$32,037,351	$7,303,607	$24,733,744	338.7
Tributaries of Great Salt Lake	14,102,393	5,017,457	9,084,936	181.1
Bear River and tributaries	3,430,663	2,397,638	1,033,025	43.1
Bear River direct	2,150,603	2,062,254	88,349	4.3
Little Bear River	720,363	163,170	557,193	341.5
Malad River	18,097	(2)	.....	.....
Other tributaries of Bear River	541,600	[3] 172,214	369,386	214.5
Weber River and tributaries	2,106,048	796,837	1,309,211	164.3
Weber River direct	1,353,323	549,432	803,891	146.3
Ogden River	423,755	168,406	255,349	151.6
East Canyon Creek	74,010	22,890	51,120	223.3
Other tributaries of Weber River	254,960	[3] 56,109	198,851	354.4
Jordan River and Utah Lake and tributaries	8,565,682	1,822,982	6,742,700	369.9
Jordan River direct	746,836	753,100	−6,264	−0.8
Big Cottonwood Creek	315,563	45,590	269,973	592.2
Little Cottonwood Creek	226,221	25,825	200,396	776.0
American Fork River	302,449	162,130	140,319	86.5
Provo River	985,979	328,691	657,288	200.0
Hobble Creek	41,024	32,588	8,436	25.9
Spanish Fork River	4,126,999	123,930	4,003,069	.....
Other tributaries of Jordan River and Utah Lake	1,820,611	[3] 351,128	1,469,483	418.5
Sevier River and tributaries	9,509,836	808,872	8,700,964	.....
Sevier River direct	7,002,349	443,032	6,559,317	.....
San Pitch River	1,142,510	228,536	913,974	399.9
Otter Creek	151,850	18,355	133,495	727.3
South Fork	372,626	15,650	356,976	.....
Other tributaries of Sevier River	840,501	[3] 103,299	737,202	713.7

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Included in "Other tributaries" in 1902.
[3] Includes springs and wells.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902—Continued.

DRAINAGE BASIN.	1920	1902	INCREASE.[1]	
			Amount.	Per cent.
Green River and tributaries	$4,154,660	$508,374	$3,646,286	717.2
Green River direct	376,325	26,150	350,175	.....
Ashley Fork River	374,140	57,835	316,305	546.9
Duchesne River	2,428,174	(2)	.....	.....
Price River	458,725	41,719	417,006	999.6
San Rafael River	288,100	295,850	−7,750	−2.6
Other tributaries of Green River	229,196	[3] 86,820	142,376	164.0
Grand River and tributaries	219,489	13,760	205,729	.....
Colorado River and tributaries	2,203,203	441,845	1,761,358	398.6
Fremont River	567,050	189,380	377,670	199.4
Virgin River	1,257,981	155,515	1,102,466	708.9
San Juan River	206,458	(2)	.....	.....
Other tributaries of Colorado River	171,714	[3] 96,950	74,764	77.1
Independent streams	1,847,770	513,299	1,334,471	260.0
Beaver River	842,305	65,325	776,980	.....
Coal Creek	179,171	7,076	172,095	.....
Deep Creek	8,844	6,692	2,152	32.2
Grouse Creek	28,338	2,850	25,488	894.3
Other independent streams	789,112	[3] 431,356	7,756	82.9

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Included in "Other tributaries" in 1902.
[3] Includes springs and wells.

In classifying capital invested by type of enterprise (Table 12) the average capital invested per acre is not presented, for the reason that it is not possible to compute this correctly. The United States Reclamation Service supplies stored water to enterprises controlled by agencies of most of the other classes shown in the table and a part of its expenditure is properly chargeable to those lands; but it is not possible to tell how much should be so charged or how it should be distributed among the various classes.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.		OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$32,037,351	100.0	1,122,456	$1.08
Individual and partnership	2,736,804	8.6	64,612	2.43
Cooperative	20,254,212	63.2	895,509	0.87
Irrigation district	265,484	0.8	19,143	0.71
Carey Act	1,323,779	4.1	16,000	0.60
Commercial	2,374,991	7.4	70,431	2.71
U. S. Reclamation Service	3,567,057	11.1	29,255	1.30
U. S. Indian Service	765,354	2.4	.....	.....
City	729,090	2.3	24,206	1.06
Other	20,580	0.1	3,300	0.33

[1] Based on area irrigated in 1919.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	143
Acreage included in enterprises reporting land drained or needing drainage	503,212
Acreage for which drains have been installed	85,448
Additional acreage needing drainage	91,976
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	17.0
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	3.6
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	7.5

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured
Average volume entering canals.....second-feet..	48,629	15,106	33,
Area irrigated in 1919.....acres..	937,243	720,715	216,
Average number of acres per second-foot.....	19	48	
Total quantity entering canals.....acre-feet..	3,554,233	2,708,931	845,
Area irrigated in 1919.....acres..	982,514	770,348	212,
Average quantity per acre.....acre-feet..	3.6	3.5	
Total quantity of water delivered.....acre-feet..	1,718,769	729,360	989,
Area irrigated in 1919.....acres..	353,424	188,406	165,
Average quantity per acre.....acre-feet..	4.9	3.9	

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet.
Total	1,479	307	2,381	29,447	6,343	4,068	5,334	476	1,600,
Before 1860	168	18	204	1,723	412	673	502	32	3,
1860–1869	205	9	366	3,145	711	615	539	22	30,
1870–1879	245	29	317	3,556	927	706	644	35	8,
1880–1889	311	127	449	6,042	1,354	827	768	71	72,
1890–1899	190	26	315	2,400	736	289	286	50	47,
1900–1904	34	9	114	2,047	291	136	157	34	10,
1905–1909	170	31	177	6,114	812	430	1,037	48	688,
1910–1914	63	16	147	2,423	459	227	1,205	71	448,
1915–1919	66	38	117	1,313	250	85	109	52	283,
Not reported	27	4	175	684	391	80	87	61	2,

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	PUMPS.	
								Number.	Capacity (gallons p minute).
Total	154.7	1,256	96,371	192	39,059	250	11,392	291	783,
Before 1860	22.1	15	1,915	7	2,210	15	134	18	7,
1860–1869	5.0	14	177	2	550	5	84	5	4,
1870–1879	22.8	9	137			3	1,840	9	6,
1880–1889	41.8	38	6,162			4	1,060	9	524,
1890–1899	13.4	109	4,640	15	2,228	12	50	13	1,
1900–1904	2.5	126	6,356	6	1,620	10	120	11	6,
1905–1909	10.2	248	24,162	19	3,880	22	1,989	28	53,
1910–1914	9.8	122	8,955	34	8,782	43	3,480	51	60,
1915–1919	9.0	168	17,833	71	16,883	104	2,332	112	108,
Not reported	18.1	407	26,034	38	2,906	32	303	35	9,

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet.
Total	1,479	307	2,381	29,447	6,343	4,068	5,334	476	1,600,
Individual and partnership	408	48	1,422	4,627	2,077	323	956	313	46,
Cooperative	1,017	241	877	21,502	3,758	3,284	3,514	143	763,
Irrigation district	37	5	33	292	83	27	53	5	260,
Carey Act	1	1	1	500	7	20	95	2	252,
Commercial	6	2	14	1,256	236	49	78	2	27,
U. S. Reclamation Service	1	2	3	820	28	35	71	1	250,
U. S. Indian Service	2		13	3	93	201	392		
City	7	8	17	425	60	120	175	10	
Other and not reported			1	22	1				

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920—Continued.

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	154.7	1,256	96,371	192	39,059	250	11,392	291	783,588
Individual and partnership	68.8	1,092	75,999	181	31,829	220	2,540	231	106,943
Cooperative	73.1	164	20,372	11	7,230	26	3,502	40	267,145
Commercial	3.6					3	4,350	12	27,000
Irrigation districts	1.2								
City	8.0					1	1,000	8	382,500

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	1,479	307	2,381	29,447	6,343	4,068	5,334	476	1,600,505
Tributaries of Great Salt Lake	576	71	1,057	13,165	2,435	1,672	2,068	164	568,177
Bear River and tributaries	118	17	319	4,253	781	479	320	48	2,026
Bear River direct	8	1	40	2,264	322	17	74	2	
Little Bear River	47	6	104	1,074	195	395	183	4	4
Malad River	2	1	3	13	10			1	2
Other tributaries of Bear River	61	9	172	902	254	67	63	41	2,020
Weber River and tributaries	256	18	391	2,823	570	146	106	52	30,794
Weber River direct	72	1	101	1,417	181	53	46	5	22
Ogden River	27		73	480	109	57	29	4	4
East Canyon Creek	38	1	40	179	49	5	5	2	28,004
Other tributaries of Weber River	119	16	177	747	231	31	26	41	2,764
Jordan River and Utah Lake and tributaries	202	36	347	6,089	1,084	1,047	1,642	64	535,357
Jordan River direct	14	4	20	1,151	296	101	20	3	600
Big Cottonwood Creek	32	3	27	228	58	160	31	4	300
Little Cottonwood Creek	21	1	36	650	60	50	45	1	750
American Fork River	27		23	70	43	63	130	4	
Provo River	31	11	99	1,752	304	416	202	21	6,681
Hobble Creek	1		13	31	9	10	4	1	2
Spanish Fork River	12	6	46	1,358	93	95	202	8	502,116
Other tributaries of Jordan River and Utah Lake	64	11	83	849	221	152	942	22	24,908
Sevier River and tributaries	95	50	321	7,762	1,391	903	1,195	63	869,405
Sevier River direct	23	13	44	4,693	468	330	508	14	741,900
San Pitch River	26	20	80	970	372	254	401	21	30,698
Otter Creek	2	3	12	86	42	24	9	3	3,900
South Fork	9		32	381	114	65	42	2	24,015
Other tributaries of Sevier River	35	14	153	1,632	395	230	235	23	68,892
Green River and tributaries	414	11	239	4,047	1,047	775	1,404	15	51,919
Green River direct	2		10	71	29	12			
Ashley Fork River	109		18	113	75	8	15		
Duchesne River	156	8	106	2,416	543	306	771	7	41,871
Price River	13	1	54	636	161	37	34	2	1,248
San Rafael River	11	2	30	591	170	401	570	6	8,800
Other tributaries of Green River	123		21	220	69	11	14		
Grand River and tributaries	36	5	80	286	132	44	24	6	13,152
Colorado River and tributaries	260	129	303	1,693	570	229	219	56	25,542
Fremont River	148	117	43	548	121	87	65	13	4,078
Virgin River	85	7	164	645	263	89	86	21	10,655
San Juan River	16	4	38	332	75	32	47	11	1,485
Other tributaries of Colorado River	11	1	58	168	111	21	21	11	324
Independent streams	98	41	381	2,494	768	445	424	172	72,310
Beaver River	36	14	128	775	210	196	229	9	40,555
Coal Creek	22	2	58	1,158	136	97	63	63	967
Deep Creek	3		21	50	36			2	
Grouse Creek	14	3	29	35	45			1	10
Other independent streams	23	22	145	476	341	152	132	97	30,778

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	154.7	1,256	96,371	192	39,059	250	11,392	291	783,588	25
Tributaries of Great Salt Lake	100.3	395	34,780	68	16,067	137	9,917	167	686,245	38
Bear River and tributaries	14.7	114	5,167	57	11,597	97	2,443	103	103,370	42
Bear River direct	1.2			2	902	26	1,678	29	74,845	41
Little Bear River	2.0	29	3,025			4	50	4	3,740	18
Malad River		2	219							
Other tributaries of Bear River	11.5	83	1,923	55	10,695	67	715	70	24,785	44
Weber River and tributaries	8.2	33	1,358	6	1,640	23	232	25	27,145	16
Weber River direct	1.3	12	388			9	106	10	6,615	14
Ogden River	1.8	9	320	1	230	1	7	1	230	33
Other tributaries of Weber River	5.1	12	650	5	1,410	13	119	14	20,300	17
Jordan River and Utah Lake and tributaries	77.4	248	28,255	5	2,830	17	7,242	39	555,730	38
Jordan River direct	0.3	9	130			5	4,300	20	388,500	19
Big Cottonwood Creek	2.0	9	92			1	1	1	500	25
American Fork River	2.2	27	2,665	1	900	3	23	3	1,830	21
Provo River	1.2	61	11,716	1	830	1	20	1	900	45
Hobble Creek		18	766	1		1	6	1		14
Spanish Fork River	9.8	21	1,390							
Other tributaries of Jordan River and Utah Lake	61.9	103	11,496	2	1,100	6	2,892	13	164,000	65
Sevier River and tributaries	9.0	258	38,863	3	178	8	117	10	18,318	30
Sevier River direct	1.9	184	27,127			1		2	11,250	
San Pitch River	3.4	16	3	1	150	1	5	1	450	4
Otter Creek		6	112							
Other tributaries of Sevier River	3.7	52	11,621	2	28	6	112	7	6,618	35
Green River and tributaries	0.9			1	1,350	10	545	13	39,315	29
Green River direct	0.3			1	1,350	8	537	10	11,580	26
Duchesne River						1		2	27,000	70
Price River	0.6									
Other tributaries of Green River						1	8	1	735	10
Grand River and tributaries	0.6					10	212	10	17,812	19
Colorado River and tributaries	11.4	6	196	3	1,500	3	32	3	900	80
Fremont River	1.0									
Virgin River	3.2	4	106	3	1,500	3	32	3	900	80
San Juan River	7.0	2	90							
Other tributaries of Colorado River	0.2									
Independent streams	32.5	597	22,532	117	19,964	82	569	88	20,998	14
Beaver River	1.5	1		11	3,610	9	91	9	4,010	21
Coal Creek	0.7	135	9,955	41	10,500	20	270	24	10,400	47
Grouse Creek				1	265	1	6	3	265	240
Other independent streams	30.3	461	12,577	64	5,589	52	202	52	6,323	9

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are shown in state bulletin on agriculture.]

	CROP.	AREA HARVESTED.					QUANTITY HARVESTED.					
		1919		1909		Per cent of increase.[1]	Unit.	1919		1909		Per cent of increase.[1]
		Acres.	Per cent of total for state.	Acres.	Per cent of total for state.			Amount.	Per cent of total for state.	Amount.	Per cent of total forstate.	
	Cereals:											
1	Corn	9,028	65.2	6,752	92.9	33.7	Bu.	193,560	72.9	155,890	91.9	24.2
2	Oats	52,695	85.2	74,687	92.4	−29.4	Bu.	1,560,574	90.5	3,065,554	95.2	−49.1
3	Winter wheat	41,289	27.6	72,293	40.5	83.7	Bu.	548,706	28.9	2,059,709	52.2	18.7
4	Spring wheat	91,533	77.0				Bu.	1,895,241	86.1			
5	Barley	11,884	74.6	15,938	59.6	−25.4	Bu.	309,724	84.8	678,240	76.1	−54.3
6	Rye	3,892	37.5	1,396	26.7	178.8	Bu.	27,915	38.5	27,412	41.7	1.8
	Hay and forage:											
7	Timothy alone	11,972	89.7	10,852	64.5	10.3	Tons.	19,200	91.1	23,585	69.2	−18.9
8	Timothy and clover mixed	31,284	94.3	3,429	20.8	812.3	Tons.	50,953	94.4	7,745	32.1	557.9
9	Clover alone	2,136	75.0	281	38.6	660.1	Tons.	3,383	83.7	620	35.1	437.8
10	Alfalfa	342,635	93.5	250,210	88.0	36.9	Tons.	735,746	98.6	724,395	91.5	2.0
11	Other tame grasses	22,341	88.0	15,756	80.4	41.8	Tons.	29,599	80.6	26,384	82.8	13.7
12	Grains cut green	9,320	59.8	1,057	68.6	932.7	Tons.	14,035	85.2	1,851	70.5	904.1
13	Annual legumes cut for hay	1,596	87.2				Tons.	3,601	89.0			
14	Wild, salt, or prairie grasses	67,344	83.2	64,160	94.5	5.0	Tons.	78,886	82.9	89,609	98.1	−12.0
15	Corn cut for forage	3,837	57.8	(2)			Tons.	9,557	75.7	(2)		
16	Silage crops	3,377	86.8	(2)			Tons.	27,284	86.9	(2)		
17	Root crops for forage	733	78.6	(2)			Tons.	7,024	78.8	(2)		
	Vegetables:											
18	Potatoes	10,758	89.3	13,264	93.3	−18.9	Bu.	1,559,386	94.6	2,237,609	92.9	−30.3
19	Green peas	2,055	84.4	(2)								
20	Tomatoes	3,428	94.0	(2)								
	Fruits:											
21	Grapes	[3] 93,344	45.5	(2)			Lbs.	535,807	48.6	(2)		
22	Apples	[4] 594,108	81.8	(2)			Bu.	756,624	99.6	(2)		
23	Peaches	[4] 510,350	93.7	(2)			Bu.	854,342	96.7	(2)		
24	Pears	[4] 46,261	89.3	(2)			Bu.	65,861	86.6	(2)		
25	Plums and prunes	[4] 55,925	83.6	(2)			Bu.	44,112	87.0	(2)		
26	Cherries	[4] 94,612	84.0	(2)			Bu.	107,238	86.8	(2)		
	Miscellaneous:											
27	Sugar beets grown for sugar	92,430	99.0	26,632	94.8	255.1	Tons.	921,418	99.0	393,897	95.2	133.9
28	Clover and alfalfa seed [5]	9,692	72.3	8,083	60.8	19.9	Bu.	46,125	75.5	36,366	69.7	26.8

	CROP.	AVERAGE YIELD PER ACRE, 1919.						VALUE.				
		Unit.	For state.	On non-irrigated land.	On irrigated land.			1919		1909		Per cent of increase.[1]
					Average.	Per cent of average for state.	Per cent of average on non-irrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Corn	Bu.	19.2	14.9	21.4	111.5	143.6	$377,442	72.9	$125,379	93.3	201.0
2	Oats	Bu.	27.9	17.9	29.6	106.1	165.4	1,872,089	90.5	1,578,417	94.5	18.6
3	Winter wheat	Bu.	12.7	12.5	13.3	104.7	106.4	1,207,153	28.9	2,006,852	53.3	167.9
4	Spring wheat	Bu.	18.5	11.2	20.7	111.9	184.8	4,169,530	86.1			
5	Barley	Bu.	22.9	13.7	26.1	114.0	190.5	526,531	84.8	369,201	78.1	42.6
6	Rye	Bu.	7.0	6.9	7.2	102.9	104.3	57,225	38.5	18,206	39.3	214.3
	Hay and forage:											
7	Timothy alone	Tons.	1.58	1.37	1.60	101.3	116.8	508,800	91.1	211,763	69.9	140.3
8	Timothy and clover mixed	Tons.	1.63	1.62	1.63	100.0	100.6	1,324,778	94.4	63,165	30.9	(1)
9	Clover alone	Tons.	1.42	0.93	1.58	111.3	169.9	74,426	83.7	5,221	35.3	(1)
10	Alfalfa	Tons.	2.66	0.45	2.16	105.4	480.0	18,838,023	98.6	5,425,453	91.2	247.2
11	Other tame grasses	Tons.	1.32	1.14	1.34	101.5	117.5	629,979	80.6	198,068	88.3	218.1
12	Grains cut green	Tons.	1.13	0.41	1.61	142.5	392.7	299,760	85.2	14,470	70.6	(1)
13	Annual legumes cut for hay	Tons.	2.21	1.90	2.26	102.3	118.9	72,020	89.0			
14	Wild, salt, or prairie grasses	Tons.	1.18	1.20	1.17	99.2	97.5	1,498,834	82.9	525,401	99.1	185.3
15	Corn cut for forage	Tons.	1.90	1.69	2.49	131.1	228.4	129,020	75.7	(2)		
16	Silage crops	Tons.	8.07	7.98	8.03	100.1	101.3	272,840	86.9	(2)		
17	Root crops for forage	Tons.	9.55	9.45	9.58	100.3	101.4	136,968	78.8	(2)		
	Vegetables:											
18	Potatoes	Bu.	136.8	69.1	145.0	106.0	209.8	3,305,893	94.6	805,094	92.1	310.6
19	Green peas							133,259	84.2	(2)		
20	Tomatoes							483,659	93.3	(2)		
	Fruits:											
21	Grapes	Lbs.	[6] 5.4	[6] 3.1	[6] 5.7	105.6	183.9	32,148	48.6	(2)		
22	Apples	Bu.	[7] 1.0	(8)	[7] 1.3	130.0		1,361,923	99.6	(2)		
23	Peaches	Bu.	[7] 1.6	[7] 0.8	[7] 1.6	100.0	200.0	1,366,947	96.7	(2)		
24	Pears	Bu.	[7] 1.5	[7] 1.8	[7] 1.4	93.3	77.8	135,015	86.6	(2)		
25	Plums and prunes	Bu.	[7] 0.8	[7] 0.6	[7] 0.8	100.0	133.3	77,196	87.0	(2)		
26	Cherries	Bu.	[7] 1.1	[7] 0.9	[7] 1.1	100.0	122.2	348,524	86.8	(2)		
	Miscellaneous:											
27	Sugar beets grown for sugar	Tons.	9.97	9.79	9.97	100.0	101.8	9,951,314	99.0	1,777,435	95.0	459.9
28	Clover and alfalfa seed [5]	Bu.	4.6	4.0	4.8	104.3	120.0	922,500	75.5	213,194	68.3	332.7

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not reported separately in 1909.
[3] Number of vines of bearing age.
[4] Number of trees of bearing age.
[5] Not including red clover seed.
[6] Average yield per vine.
[7] Average yield per tree.
[8] Returns not sufficient to justify an average.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (—) denotes decrease.]

		THE STATE.	Beaver.	Box Elder.	Cache.	Carbon.	Daggett.[1]	Davis.	Duchesne.[2]	Emery.	Garfield.
1	Number of all farms in 1920	25,662	373	1,859	2,242	235	37	1,172	1,248	759	540
2	Number of farms irrigated in 1919	22,218	343	1,538	1,969	181	36	1,096	1,188	727	410
3	Per cent of all farms	86.6	92.0	82.7	87.8	77.0	97.3	93.5	95.2	95.8	75.9
4	Number of farms irrigated in 1909	19,709	313	1,271	1,501	169	.....	1,193	.....	664	383
5	Per cent of increase, 1909-1919	12.7	9.6	21.0	31.2	7.1	.....	−8.1	.....	9.5	7.0
	LAND AND FARM AREA.										
6	Approximate land area—acres	52,597,760	1,702,400	3,484,160	744,960	951,680	544,000	176,000	2,090,240	2,849,920	3,349,760
7	All land in farms—acres	5,050,410	52,626	542,348	317,698	35,899	18,665	98,732	252,031	105,268	113,712
8	Improved land in farms—acres	1,715,380	33,094	219,657	183,654	12,117	5,104	52,029	96,697	43,587	33,738
9	Area irrigated in 1919—acres	1,371,051	28,103	86,734	94,705	21,676	6,572	19,468	90,435	91,145	27,097
10	Per cent of improved land in farms	80.0	84.9	39.5	51.6	178.9	128.8	37.4	93.5	209.1	80.3
11	Area irrigated in 1909—acres	999,410	24,430	75,926	77,330	11,620	.....	25,291	.....	46,776	26,437
12	Per cent of increase, 1909-1919	37.2	15.0	14.2	22.5	86.5	.....	−23.0	.....	94.9	2.5
13	Area enterprises were capable of irrigating in 1920—acres	1,700,550	45,829	100,633	96,619	22,458	10,599	19,536	140,100	98,933	27,353
14	Area enterprises were capable of irrigating in 1910—acres	1,250,246	26,630	94,133	82,503	30,802	.....	25,447	.....	50,524	33,532
15	Per cent of increase, 1910-1920	36.0	72.1	6.9	17.1	−27.2	.....	−23.2	.....	95.8	−18.4
16	Area included in enterprises in 1920—acres	2,359,244	52,180	145,405	100,507	33,381	10,600	20,375	225,959	112,943	54,998
17	Area included in enterprises in 1910—acres	1,947,625	31,931	129,034	119,304	40,778	.....	35,245	.....	87,303	49,322
18	Per cent of increase, 1910-1920	21.1	63.2	12.7	−15.8	−18.1	.....	−42.2	.....	29.4	11.5
19	Area of irrigated land reported as available for settlement—acres	189,563	16,874	15,590	80	10,700	3,750	.....	30,100	19,120	.....
	IRRIGATION WORKS.										
	Independent enterprises:										
20	Number, 1920	2,403	95	220	133	40	8	187	71	31	82
21	Number, 1910	2,472	109	218	137	45	.....	116	.....	46	107
	Main ditches:										
22	Number, 1920	2,381	120	164	177	43	7	41	85	46	87
23	Number, 1910	2,495	125	185	139	50	.....	47	.....	51	106
24	Length, 1920—miles	6,343	207	401	344	141	28	72	356	227	221
25	Length, 1910—miles	5,887	208	354	324	123	.....	129	.....	236	202
26	Capacity, 1920—second-feet	29,447	759	1,411	1,820	546	153	114	1,588	1,061	464
27	Capacity, 1910—second-feet	25,081	611	2,107	1,393	600	.....	495	.....	1,065	971
	Laterals:										
28	Number, 1920	4,068	195	67	433	31	2	81	265	447	37
29	Number, 1910	1,357	37	84	153	3	.....	41	.....	2	60
30	Length, 1920—miles	5,334	229	76	229	24	5	72	658	626	57
31	Length, 1910—miles	1,822	31	116	142	6	.....	59	.....	1	34
	Reservoirs:										
32	Number, 1920	476	7	46	6	2	.....	72	7	9	5
33	Number, 1910	480	13	69	1	4	.....	28	.....	15	18
34	Capacity, 1920—acre-feet	1,600,505	40,451	3,597	1,509	1,248	.....	23,135	41,871	8,875	24,521
35	Capacity, 1910—acre-feet	588,317	12,945	260	1,566	26,746	.....	14,511	.....	13,850	43,477
	Flowing wells:										
36	Number, 1920	1,256	1	82	32	.....	.....	379	.....	.....	.....
37	Number, 1910	1,138	.....	77	33	.....	.....	242	.....	.....	.....
38	Capacity, 1920—gallons per minute	96,371	.....	1,880	3,287	.....	.....	8,135	.....	.....	.....
39	Capacity, 1910—gallons per minute	42,794	.....	1,768	734	.....	.....	9,551	.....	.....	.....
	Pumped wells:										
40	Number, 1920	192	11	61	.....	.....	.....	54	.....	.....	.....
41	Number, 1910	27	.....	22	.....	.....	.....	.....	.....	1	.....
42	Capacity, 1920—gallons per minute	39,059	3,610	12,932	.....	.....	.....	4,319	.....	.....	.....
43	Capacity, 1910—gallons per minute	4,827	.....	3,964	.....	.....	.....	.....	.....	480	.....
	Pumping plants:										
44	Number, 1920	250	9	71	27	.....	2	50	1	2	.....
45	Number, 1910	69	.....	23	.....	.....	.....	.....	.....	11	.....
46	Engine capacity, 1920—horsepower	11,392	91	762	1,604	.....	13	179	.....	425	.....
47	Engine capacity, 1910—horsepower	2,143	.....	206	.....	.....	.....	.....	.....	376	.....
48	Pump capacity, 1920—gallons per minute	783,588	4,010	25,205	76,200	.....	965	5,253	27,000	8,000	.....
49	Pump capacity, 1910—gallons per minute	315,057	.....	3,987	.....	.....	.....	.....	.....	62,000	.....
50	Average lift, 1920—feet	25	21	46	.....	.....	11	9	70	46	.....
	CAPITAL INVESTED.										
51	Capital invested to Jan. 1, 1920—dollars	32,037,351	831,344	1,806,863	1,436,207	420,075	112,698	522,313	1,432,832	781,800	430,199
52	Capital invested to July 1, 1910—dollars	14,028,717	91,922	1,880,966	304,285	449,291	.....	408,483	.....	509,285	262,095
53	Per cent of increase, 1910-1920	128.4	804.4	−3.9	372.0	−6.5	.....	27.9	.....	53.5	64.1
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	18.84	18.14	17.95	14.86	18.70	10.63	26.74	10.23	7.90	15.73
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	11.22	3.45	19.98	3.69	14.56	.....	16.05	.....	10.08	7.82
	ESTIMATED FINAL COST.										
56	Estimated final cost of existing enterprises in 1920—dollars	33,835,641	859,444	2,084,063	1,472,007	420,075	112,698	545,313	1,848,675	871,800	430,199
57	Estimated final cost of existing enterprises in 1910—dollars	17,840,775	96,922	1,880,966	304,285	494,151	.....	408,483	.....	587,485	266,075
58	Per cent of increase, 1910-1920	89.7	786.7	10.8	383.8	−15.0	.....	33.5	.....	48.4	61.7
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	14.34	16.47	14.08	14.65	12.58	10.63	26.76	8.18	7.72	7.82
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	9.16	3.04	14.58	2.55	12.12	.....	11.59	.....	6.73	5.39

[1] Formed from part of Uintah County in 1918.

[2] Formed from part of Wasatch County in 1915; part of Uintah County annexed in 1917.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.]

		Grand.	Iron.	Juab.	Kane.	Millard.	Morgan.	Piute.[1]	Rich.[2]	Salt Lake.	San Juan.
1	Number of all farms in 1920	114	646	419	229	1,038	239	246	224	2,438	405
2	Number of farms irrigated in 1919	89	512	305	172	941	232	224	204	1,564	203
3	Per cent of all farms	78.1	79.3	72.8	75.1	90.7	97.1	91.1	91.1	64.2	50.1
4	Number of farms irrigated in 1909	126	317	333	118	689	240	193	212	2,048	139
5	Per cent of increase, 1909–1919	−29.4	61.5	−8.4	45.8	36.6	−3.3	16.1	.....	−23.6	46.0
	LAND AND FARM AREA.										
6	Approximate land area—acres	2,362,880	2,083,840	2,170,640	2,697,600	4,199,040	400,640	488,320	659,840	483,840	4,967,040
7	All land in farms—acres	42,656	278,671	105,741	71,851	185,197	117,280	35,093	236,971	317,281	167,739
8	Improved land in farms—acres	8,191	46,765	49,751	12,309	91,685	15,926	16,730	48,813	92,447	33,491
9	Area irrigated in 1919—acres	5,865	32,066	10,008	4,088	137,980	12,242	8,514	42,913	102,051	13,469
10	Per cent of improved land in farms	71.6	68.6	20.1	33.2	150.5	76.9	50.9	87.9	110.4	40.2
11	Area irrigated in 1909—acres	6,759	11,624	14,216	3,220	48,992	11,309	13,262	93,030	82,710	8,915
12	Per cent of increase, 1909–1919	−13.2	175.9	−29.6	27.0	181.6	8.3	−35.8	.....	23.4	51.1
13	Area enterprises were capable of irrigating in 1920—acres	9,664	38,858	12,372	4,469	209,694	13,506	10,258	43,503	125,194	23,283
14	Area enterprises were capable of irrigating in 1910—acres	8,723	12,321	16,949	3,330	91,788	11,606	15,406	68,780	100,555	9,336
15	Per cent of increase, 1910–1920	10.8	215.4	−27.0	34.2	128.5	16.4	−33.4	.....	24.5	149.4
16	Area included in enterprises in 1920—acres	11,010	98,475	14,707	7,114	373,926	13,809	10,938	50,238	176,122	40,511
17	Area included in enterprises in 1910—acres	22,372	19,652	21,699	6,633	241,922	12,058	51,253	89,791	121,452	21,254
18	Per cent of increase, 1910–1920	−50.8	401.1	−32.2	7.3	54.6	14.5	−78.7	.....	45.0	90.6
19	Area of irrigated land reported as available for settlement—acres	.....	.....	.....	45	29,116	.....	.....	.....	20,505	4,715
	IRRIGATION WORKS.										
	Independent enterprises:										
20	Number, 1920	37	86	27	25	66	95	22	37	135	42
21	Number, 1910	56	47	43	7	47	77	39	48	112	75
	Main ditches:										
22	Number, 1920	51	75	30	27	77	114	36	59	129	69
23	Number, 1910	51	31	47	33	50	94	51	60	95	47
24	Length, 1920	76	164	67	46	439	156	75	180	520	134
25	Length, 1910	84	58	101	42	282	134	154	186	298	77
26	Capacity, 1920—second-feet	150	1,242	156	89	3,560	748	722	1,205	2,530	475
27	Capacity, 1910—second-feet	270	144	376	168	1,437	432	694	769	1,746	252
	Laterals:										
28	Number, 1920	10	103	73	9	151	52	120	11	383	66
29	Number, 1910	16	8	31	4	52	35	13	39	89	2
30	Length, 1920—miles	8	67	58	8	384	26	35	30	926	63
31	Length, 1910—miles	18	9	30	6	154	18	13	66	123	1
	Reservoirs:										
32	Number, 1920	3	66	3	9	21	3	3	4	14	14
33	Number, 1910	.....	21	5	11	12	7	3	12	5	12
34	Capacity, 1920—acre-feet	2,752	9,968	3,100	218	672,617	104	55,000	52	3,051	11,885
35	Capacity, 1910—acre-feet	.....	2,229	79	199	173,518	74	131,040	10,531	932	292
	Flowing wells:										
36	Number, 1920	.....	139	11	.....	178	.....	.....	.....	20	2
37	Number, 1910	.....	86	6	.....	.....	.....	10	.....	68	10
38	Capacity, 1920—gallons per minute	.....	10,061	342	.....	28,955	.....	.....	.....	222	90
39	Capacity, 1910—gallons per minute	.....	2,137	100	.....	.....	.....	3,600	.....	1,910	774
	Pumped wells:										
40	Number, 1920	.....	41	1	.....	.....	.....	.....	.....	1	.....
41	Number, 1910	.....	.....	.....	.....	1	.....	.....	.....	2	1
42	Capacity, 1920—gallons per minute	.....	10,500	28	.....	.....	.....	.....	.....	.....	.....
43	Capacity, 1910—gallons per minute	.....	.....	.....	.....	116	.....	.....	.....	67	200
	Pumping plants:										
44	Number, 1920	11	21	3	.....	1	.....	.....	2	9	.....
45	Number, 1910	10	.....	.....	.....	1	.....	.....	.....	2	1
46	Engine capacity, 1920—horsepower	227	272	28	.....	.....	.....	.....	46	4,323	.....
47	Engine capacity, 1910—horsepower	404	.....	.....	.....	2	.....	.....	.....	3	15
48	Pump capacity, 1920—gallons per minute	17,812	10,400	2,468	.....	11,250	.....	.....	3,300	524,900	.....
49	Pump capacity, 1910—gallons per minute	31,057	.....	.....	.....	116	.....	.....	.....	67	200
50	Average lift, 1920—feet	18	56	40	.....	.....	.....	.....	40	34	.....
	CAPITAL INVESTED.										
51	Capital invested to Jan. 1, 1920—dollars	167,511	854,295	502,667	150,188	5,148,282	147,278	253,668	319,225	2,096,530	259,287
52	Capital invested to July 1, 1910—dollars	133,699	41,569	156,298	63,064	1,654,652	53,197	312,310	268,005	1,817,542	78,337
53	Per cent of increase, 1910–1920	25.3	.....	220.0	138.2	211.1	176.9	−18.8	19.1	15.3	231.0
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	17.33	21.99	45.48	33.61	24.55	10.90	24.73	7.34	16.75	11.14
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	15.33	3.37	9.22	18.94	18.03	4.58	20.27	3.90	18.08	8.39
	ESTIMATED FINAL COST.										
56	Estimated final cost of existing enterprises in 1920—dollars	218,211	882,370	564,667	152,688	5,210,982	147,378	255,168	319,225	2,154,030	319,162
57	Estimated final cost of existing enterprises in 1910—dollars	133,699	44,468	156,298	65,397	2,088,652	53,197	450,648	268,005	1,827,542	90,337
58	Per cent of increase, 1910–1920	63.2	.....	261.3	133.5	149.5	177.0	−43.4	19.1	17.9	253.3
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	19.82	8.96	38.39	21.46	13.94	10.67	23.33	6.35	12.23	7.88
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	5.98	2.26	7.20	9.86	8.63	4.41	8.79	2.98	15.05	4.25

[1] Part of Piute County annexed to Sevier County in 1902.

[2] Part of Summit County annexed in 1917.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease.]

		Sanpete.	Sevier.[1]	Summit.[2]	Tooele.	Uintah.[3]	Utah.	Wasatch.[4]	Washington.	Wayne.	Weber.
1	Number of all farms in 1920	1,813	1,108	521	417	899	3,237	507	738	272	1,687
2	Number of farms irrigated in 1919	1,646	1,069	485	305	805	2,990	487	667	264	1,566
3	Per cent of all farms	90.8	96.5	93.1	73.1	89.5	92.4	96.1	90.4	97.1	92.8
4	Number of farms irrigated in 1909	1,650	1,034	396	272	586	2,717	946	508	235	1,396
5	Per cent of increase, 1909–1919	−0.2	3.4	.....	12.1	.....	10.0	.....	17.4	12.3	12.2
	LAND AND FARM AREA.										
6	Approximate land area—acres	1,034,240	1,265,920	1,196,800	4,383,360	2,748,160	1,301,760	746,880	1,577,600	1,584,000	346,240
7	All land in farms—acres	391,007	113,005	271,778	163,375	126,151	318,133	150,536	127,899	33,551	259,566
8	Improved land in farms—acres	138,552	66,960	38,807	49,570	54,407	135,996	25,132	29,023	14,293	66,855
9	Area irrigated in 1919—acres	90,153	68,838	32,139	9,652	80,789	138,143	22,797	20,838	16,198	56,973
10	Per cent of improved land in farms	65.1	102.8	82.8	19.5	148.5	101.6	90.7	71.8	113.3	85.2
11	Area irrigated in 1909—acres	88,959	51,622	37,245	12,318	48,469	89,886	39,031	18,686	13,842	47,505
12	Per cent of increase, 1909–1919	1.3	33.4	.....	−21.6	.....	53.7	.....	11.5	17.0	19.9
13	Area enterprises were capable of irrigating in 1920—acres	91,885	69,178	32,394	11,453	127,787	173,487	22,892	29,077	18,690	70,846
14	Area enterprises were capable of irrigating in 1910—acres	90,389	52,425	39,313	13,606	130,850	102,926	49,539	24,662	15,980	48,131
15	Per cent of increase, 1910–1920	1.7	32.0	.....	−15.8	.....	68.6	.....	17.9	17.0	47.2
16	Area included in enterprises in 1920—acres	127,708	81,548	34,795	17,405	147,608	203,065	24,883	43,387	19,090	105,897
17	Area included in enterprises in 1910—acres	133,589	68,993	46,312	18,523	186,886	127,020	106,841	67,081	34,617	56,160
18	Per cent of increase, 1910–1920	−4.4	18.2	.....	−6.0	.....	59.9	.....	−35.9	−43.8	88.6
19	Area of irrigated land reported as available for settlement—acres	.....	2,556	.....	.....	1,100	27,664	.....	6,848	800	.....
	IRRIGATION WORKS.										
	Independent enterprises:										
20	Number, 1920	91	82	132	69	42	210	48	126	29	135
21	Number, 1910	106	78	173	77	66	230	162	105	39	107
	Main ditches:										
22	Number, 1920	93	73	158	55	54	146	62	137	37	129
23	Number, 1910	177	69	173	70	90	226	166	138	49	75
24	Length, 1920—miles	429	312	232	144	295	381	161	226	97	212
25	Length, 1910—miles	394	234	277	168	371	460	395	263	141	192
26	Capacity, 1920—second-feet	1,159	1,979	665	146	996	2,725	766	527	174	1,517
27	Capacity, 1910—second-feet	1,630	1,300	635	239	3,136	1,730	1,305	437	366	683
	Laterals:										
28	Number, 1920	262	288	24	20	58	449	212	79	59	72
29	Number, 1910	118	44	138	36	160	70	38	17	17	50
30	Length, 1920—miles	407	274	23	40	137	624	89	80	19	60
31	Length, 1910—miles	139	55	58	28	384	133	56	15	21	106
	Reservoirs:										
32	Number, 1920	23	16	18	16	.....	32	16	18	10	33
33	Number, 1910	30	17	22	37	5	56	17	16	18	26
34	Capacity, 1920—acre-feet	30,708	87,779	1,810	21	.....	527,715	3,581	10,654	4,003	30,280
35	Capacity, 1910—acre-feet	33,816	11,925	488	443	464	48,612	1,484	44,242	14,274	320
	Flowing wells:										
36	Number, 1920	33	46	.....	80	.....	220	.....	.....	.....	33
37	Number, 1910	156	103	.....	102	.....	195	.....	.....	.....	50
38	Capacity, 1920—gallons per minute	505	9,395	.....	4,362	.....	27,729	.....	.....	.....	1,358
39	Capacity, 1910—gallons per minute	4,070	5,125	.....	2,102	.....	9,316	.....	.....	.....	1,607
	Pumped wells:										
40	Number, 1920	1	1	.....	7	1	4	.....	3	.....	6
41	Number, 1910	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
42	Capacity, 1920—gallons per minute	150	.....	.....	200	1,350	2,830	.....	1,500	.....	1,040
43	Capacity, 1910—gallons per minute	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Pumping plants:										
44	Number, 1920	1	3	1	.....	4	8	.....	2	.....	22
45	Number, 1910	.....	.....	.....	.....	3	5	.....	3	.....	1
46	Engine capacity, 1920—horsepower	5	84	6	.....	92	2,019	.....	30	.....	226
47	Engine capacity, 1910—horsepower	.....	.....	.....	.....	54	956	.....	102	.....	25
48	Pump capacity, 1920—gallons per minute	450	4,150	900	.....	3,350	30,830	.....	900	.....	26,245
49	Pump capacity, 1910—gallons per minute	.....	.....	.....	.....	3,700	202,900	.....	2,330	.....	8,700
50	Average lift, 1920—feet	4	32	12	.....	20	43	.....	20	.....	17
	CAPITAL INVESTED.										
51	Capital invested to Jan. 1, 1920—dollars	1,288,433	2,083,537	229,639	136,263	1,488,111	5,889,832	410,198	576,824	453,600	1,756,652
52	Capital invested to July 1, 1910—dollars	630,936	404,501	143,499	165,573	939,427	1,868,232	442,162	372,362	113,935	463,090
53	Per cent of increase, 1910–1920	104.2	415.1	.....	−17.7	.....	214.8	.....	54.9	298.1	279.3
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	14.02	30.12	7.09	11.90	11.65	33.90	17.92	19.84	24.27	24.80
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	6.98	7.72	3.65	12.17	7.18	18.15	8.93	15.10	7.13	9.62
	ESTIMATED FINAL COST.										
56	Estimated final cost of existing enterprises in 1920—dollars	1,346,933	2,208,437	242,839	136,263	1,711,468	6,010,982	450,198	628,774	467,200	1,764,392
57	Estimated final cost of existing enterprises in 1910—dollars	658,214	404,501	143,499	165,573	995,635	4,613,401	525,965	507,362	146,925	463,090
58	Per cent of increase, 1910–1920	104.6	446.0	.....	−17.7	.....	31.5	.....	23.9	218.0	281.0
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	10.55	27.08	6.98	7.83	11.59	29.88	18.09	14.49	23.73	16.66
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	4.93	5.86	3.10	8.94	5.33	36.32	4.92	7.50	4.24	8.25

[1] Part of Piute County annexed to Sevier County in 1902.
[2] Part annexed to Rich County in 1917; part of Uintah County annexed to Summit County in 1917.
[3] Part s annexed to Duchesne and Summit Counties in 1917; part taken to form Daggett County in 1918.
[4] Part taken to form Duchesne County in 1915.

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FOURTEENTH CENSUS OF THE UNITED STATES: 1920

DEPARTMENT OF COMMERCE

BULLETIN

BUREAU OF THE CENSUS
SAM. L. ROGERS, DIRECTOR

IRRIGATION : WASHINGTON

STATISTICS FOR THE STATE AND ITS COUNTIES

Prepared under the supervision of WILLIAM LANE AUSTIN, Chief Statistician for Agriculture, by R. P. TEELE, Special Agent in Charge of Irrigation.

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INTRODUCTION.

This bulletin presents the statistics of irrigation for the state of Washington, collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the bulletin figures for the census of 1910 are given for purpose of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

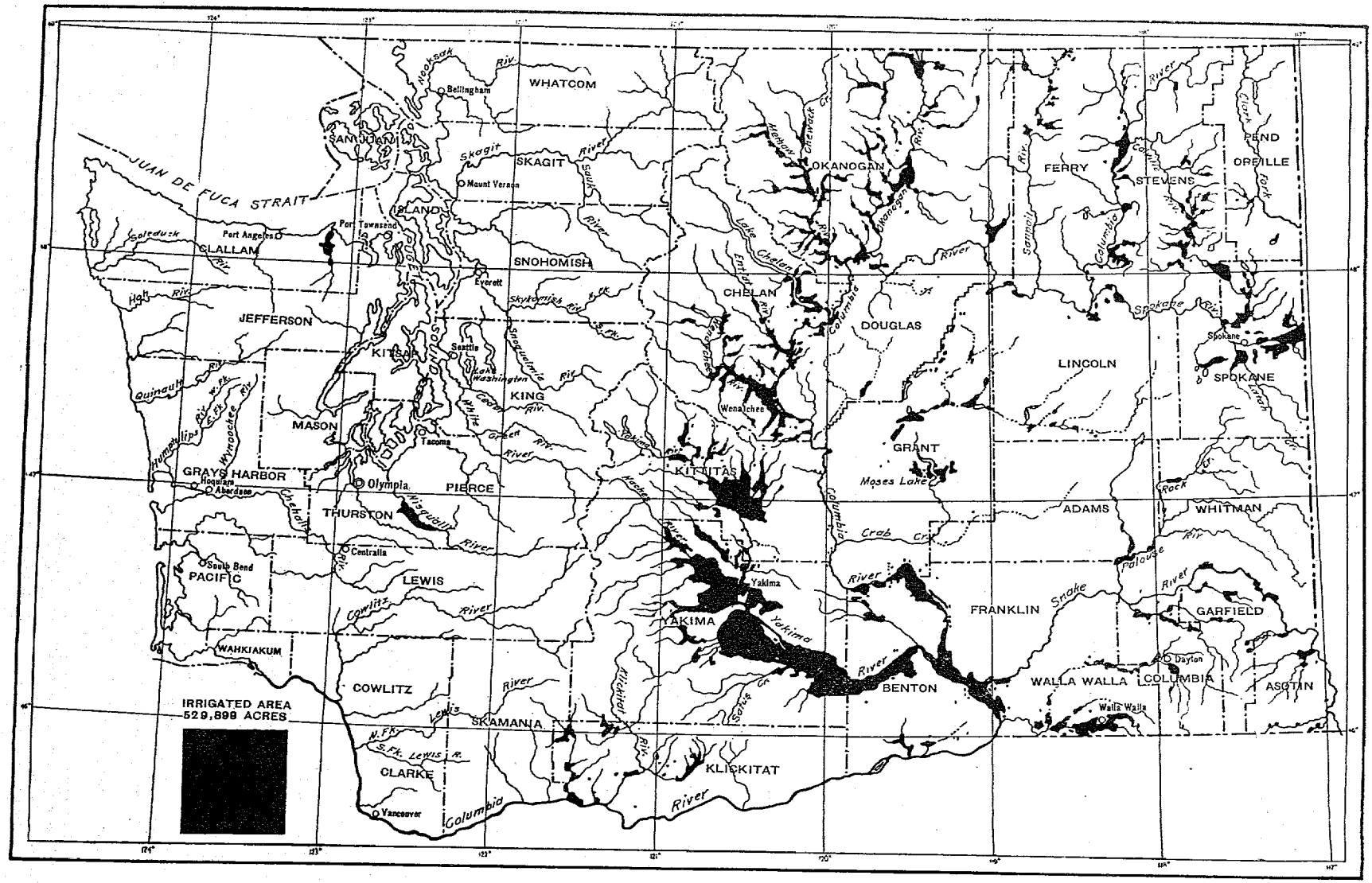
ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	66,318	56,192	10,126	18.0
Approximate land area of state ..... acres..	42,775,040	42,775,040	.....	.....
All land in farms ..... acres..	13,219,053	11,712,235	1,506,818	12.9
Improved land in farms ..... acres..	7,129,343	6,373,311	756,032	10.6
Number of farms irrigated	13,271	7,664	5,607	73.2
Acreage irrigated ..... acres..	529,899	334,378	195,521	58.5
Acreage enterprises were capable of irrigating ..... acres..	637,151	470,514	166,637	35.4
Acreage included in enterprises ..... acres..	836,795	817,032	19,763	2.4
Per cent irrigated:				
Number of all farms	20.0	13.6	6.4	.....
Approximate land area of state	1.2	0.8	0.4	.....
Land in farms	4.0	2.9	1.1	.....
Improved land in farms	7.4	5.2	2.2	.....
Excess of acreage enterprises were capable of irrigating over acreage irrigated ..... acres..	107,252	136,136	−28,884	−21.2
Excess of acreage included in enterprises over acreage irrigated .. acres..	306,896	482,654	−175,758	−36.4
Acreage of irrigated land reported as available for settlement ..... acres..	61,738	(2)	.....	.....
Capital invested	$29,299,011	$16,219,149	$13,079,862	80.6
Average per acre enterprises were capable of irrigating	$45.98	$34.47	$11.51	33.4
Estimated final cost of existing enterprises	$37,684,591	$22,322,856	$15,361,735	68.8
Average per acre included in enterprises	$45.03	$27.32	$17.71	64.8
Average cost of operation and maintenance of irrigation works per acre.	$3.45	$3.08	$0.37	12.0

[1] A minus sign (−) denotes decrease.

[2] Not reported in 1910.

WASHINGTON

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.



EXPLANATION OF TERMS.

Farms irrigated.—The number of "farms irrigated" is the number on which irrigation is practiced, and for the purposes of this inquiry a "farm" is defined as for the general census of agriculture; that is, to be classed as a farm an establishment either must be 3 acres in extent or must have produced crops to the value of $250 in 1919, or must have required for its agricultural operations the continuous services of at least one person. "Number of farms irrigated" as used in this report and in that of 1910, is equivalent to the term "number of irrigators" used in census reports on irrigation previous to 1910.

Irrigation enterprise.—An "enterprise" is an independent irrigation establishment and includes the equipment for supplying water and the land to which water is supplied or is to be supplied, except that the cost or value of the land is not included in the "capital invested."

Acreage irrigated, in enterprises, and available for settlement.—Acreage irrigated is the acreage to which water was actually applied in the season preceding the census year—1919 for the Fourteenth Census and 1909 for the Thirteenth Census.

Acreage to which enterprises were capable of supplying water relates to the season following the time of taking the census and, consequently, is based on estimates made by those controlling the enterprises.

Acreage included in enterprises represents the extent of the plans of those controlling enterprises.

Acreage of irrigated land reported as available for settlement relates to land within existing enterprises and not to land that is susceptible of reclamation and settlement by new enterprises or extensions of existing enterprises.

Types of enterprises.—The types of enterprises under which all data are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands. In addition to serving land within its own projects, the United States Reclamation Service supplies stored water to land within other enterprises.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who may own no interest in the works.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization.

Capital invested.—The capital invested in irrigation enterprises is that reported by the owners. For the larger works the capital invested is taken, in most cases, from books of account and represents the actual investment. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the capital reported represents the owners' estimates. The schedules used in 1910 called for "cost," while the schedule used in the present census calls for "capital invested," but the instructions accompanying the schedules make these two terms equivalent. In both cases the investment includes cost of construction and of acquiring rights. The latter usually consists of filing fees only, but in some instances it includes the purchase price of rights. However, these cases are so rare that they are unimportant. The cost reported for 1900 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. For the Thirteenth and Fourteenth Censuses the average cost per acre is based on the acreage which enterprises were capable of irrigating in the census year and the cost to the date of the census—January 1, 1920, for the Fourteenth Census, and July 1, 1910, for the Thirteenth Census.

Operation and maintenance.—Cost of operation and maintenance was not reported on all schedules, and averages are based on the acreages for which cost is reported. No estimate of total cost of operation and maintenance for all irrigation enterprises has been made. In the case of enterprises operating pumping plants the cost of operation and maintenance includes cost of fuel and attendance.

Water rights.—The acreage irrigated has been classified by the character of rights under which water is received. The classes used are defined as follows:

"*Appropriation and use*" includes all rights acquired without formalities of any kind that have not been defined by the courts.

"*Notice filed and posted*" includes rights for which claims of some kind have been either posted or filed that have not been defined by the courts.

"*Adjudicated by court*" includes all rights that have been defined by the courts.

"*Permit from state*" includes all rights initiated under laws requiring any party wishing to acquire rights to obtain a permit from the state.

"*Certificate or license from the state*" includes rights acquired under laws providing for the issuing by the state of certificates or licenses defining rights acquired.

"*Riparian rights*" includes rights based on the ownership of riparian land.

"*Underground*" represents water taken from wells.

Source of water supply.—In classifying acreage by source of supply from which water for irrigation is obtained, in 1910 acreage was credited to what seemed to be the principal source of supply, while in the census of 1920 the attempt is made to represent the facts more nearly by presenting various mixed classes.

Date of beginning.—The date of beginning of irrigation enterprises is, in some cases, the date when construction began, and, in other cases, the date of filing a claim or of applying for a permit. If a filing or application for permit was made and work was begun and continued with reasonable diligence the date of filing is considered the date of beginning, otherwise the date of construction is taken as the date of beginning.

Drainage basin.—The drainage basin of a stream is all of the land drained by the stream and its tributaries.

Units of quantity and capacity.—Capacities of canals, reservoirs, wells, pumps, and engines, and quantities of water used are expressed in the units commonly used in engineering literature to express the same items. They are as follows:

Capacities of canals and volumes of flowing water are given in second-feet, a shorter equivalent for cubic feet per second.

Capacities of wells and pumps are given in gallons per minute Four hundred and fifty gallons per minute equal 1 second-foot.

Capacities of reservoirs are given in acre-feet. An acre-foot is the quantity of water that will cover 1 acre to a depth of 1 foot. It equals 43,560 cubic feet.

Capacities of engines and motors are given in horsepower. One horsepower is the power required to lift 33,000 pounds through a vertical distance of 1 foot in 1 minute of time.

CLIMATIC CONDITIONS.

With reference to climatic conditions and the necessity for irrigation, the state of Washington may be divided into three fairly distinct zones—humid, arid, and semiarid.

West of the Cascade Mountains there is a heavy annual precipitation, varying from 21 to 55 inches in the valleys, and from 55 inches upward in the mountains. In this section of the state there is a fairly well-defined wet season, more than 80 per cent of the precipitation occurring between October 15 and May 15, or the winter season. July and August are the driest months, the average precipitation for each of these months at many points being less than 1 inch. This creates a necessity for irrigation if crops not capable of withstanding considerable periods of drought are to be grown during the late summer months. However, only small areas are irrigated in this part of the state.

Immediately east of the Cascades and between them and Columbia River lies the arid section of the state. The rainfall at the summit of the Cascades is very heavy, but in the valleys, extending from the mountains to the Columbia, it varies from 12 to 6 inches per annum, and irrigation is necessary to the growing of crops. Most of the irrigated land in the state lies in this section.

East of the Columbia River lies the great wheat belt of Washington, where the annual rainfall varies from 13 to 25 inches. In this section most of the precipitation occurs in the fall, winter, and spring, leaving a dry summer season for the grain harvest. In this section there is little irrigation, although the desire to diversify crops has led to the consideration of many plans for irrigating large areas. These plans have not, however, advanced far enough to enter into the tabulation.

Weather conditions in 1919 were peculiarly unfavorable. The meteorologist of the United States Weather Bureau for the Washington section, in his annual summary, makes the following statement regarding the year 1919:

> The most striking features of the weather in the year 1919 were the heavy rains, melting snows, and consequent freshets of January, a cold and backward spring, an unusually long and excessive drought in which the precipitation was deficient from April to November, periods of hot and desiccating winds in June and July * * *.
>
> The snowfall of the season of 1918–19 was so much lighter in the mountains than the average that the irrigation supply proved inadequate at some projects, owing largely to the unusual demands of an excessively dry and hot summer. During the growing season there was even a less supply of rain than in the preceding year, which had also a noteworthy scarcity of precipitation.
>
> From an agricultural point of view the year was hardly a successful one, but there was an unprecedented crop of unusually fine apples.

WATER SUPPLY FOR IRRIGATION.

West of the Cascade Mountains the streams flowing from these mountains and the Olympic Mountains to the Pacific Ocean and Puget Sound and to Columbia River furnish an ample supply of water for the small amount of irrigation required.

The streams most used for irrigation are those heading on the eastern slope of the Cascade Mountains and flowing into the Columbia. The precipitation on the Cascades is very heavy, affording a large supply of water, and there are many lakes on the headwaters of the rivers, affording opportunity for storing the flood water. The larger streams in this section, named in the order in which they enter the Columbia, from south to north, are the Klickitat, Yakima, Wenatchee, Entiat, Chelan, Methow, and Okanogan. While the building of storage reservoirs on these streams has been begun, there is opportunity for much additional storage. The streams named supply water to about 80 per cent of the total irrigated acreage of the state, Yakima River and tributaries alone supplying about 64 per cent of the total acreage.

East of Columbia River the principal streams entering the Columbia from the east, named in order from south to north, are the following: Walla Walla River, rising in the Blue Mountains in eastern Washington and Oregon; Snake River, rising in western Wyoming, flowing across the state of Idaho, and forming the eastern boundary of Oregon and Washington for nearly 200 miles; Spokane River, rising in Idaho; Colville River, rising in eastern Washington; and Clarks Fork, rising in western Montana, flowing across northern Idaho and through northeastern Washington, and entering Columbia River just north of the international boundary. In this section of the state crops are grown without irrigation, and the water supply is not all utilized.

The Columbia itself enters the state from Canada near the northeast corner of the state and drains a large area in western Montana, northern Idaho, and southern Canada before entering Washington. Throughout most of its course the Columbia flows in a deep channel far below the level of the adjoining land and is not used to a large extent for irrigation.

The acreages irrigated from the various streams of the state and their tributaries are given in Table 7.

The extent of the supply of underground water has not been determined. Of the 60 flowing wells reported as being used for irrigation, two-thirds are in the vicinity of the confluence of Columbia and Snake Rivers. Pumped wells are more generally distributed, but nearly one-half of those reported are located in Benton and Grant Counties.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			ACREAGE IRRIGATED.				
	Number.	Per cent of increase.	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	13,271	73.2	20.0	529,899	58.5	1.2	4.0	7.4
1910	7,664	118.2	13.6	334,378	146.8	0.8	2.9	5.2
1900	3,513	235.9	10.6	135,470	177.6	0.3	1.6	3.9
1890	1,046	.....	5.8	48,799	.....	0.1	1.2	2.7

TABLE 3.—ACREAGE CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Acreage in enterprises.	ACREAGE IRRIGATED IN 1919.		Acreage enterprises were capable of irrigating in 1920.
			Amount.	Per cent of acreage in enterprises.	
Total	2,692	836,795	529,899	63.3	637,151
Before 1860	7	1,066	461	43.2	806
1860–1869	10	998	798	80.0	887
1870–1879	89	24,619	22,650	92.0	23,602
1880–1889	226	79,276	65,791	83.0	68,546
1890–1899	315	208,025	126,359	60.7	145,602
1900–1904	274	59,942	42,534	71.0	49,136
1905–1909	343	278,907	175,383	62.9	217,215
1910–1914	483	85,461	30,663	35.9	50,788
1915–1919	427	49,757	24,466	49.2	38,771
Not reported	518	48,744	40,794	83.7	41,798

TABLE 4.—ACREAGE CLASSIFIED BY SOURCE OF WATER SUPPLY.

CLASS.	ACREAGE IRRIGATED.				Acreage enterprises were capable of irrigating, 1920.	Acreage included in enterprises, 1920.
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	529,899	334,378	195,521	58.5	637,151	836,795
Stream, gravity	352,199	301,341	50,858	16.9	416,769	550,325
Stream, pumped	26,244	9,085	17,159	188.9	49,545	71,150
Stream, pumped and gravity	92,702	(2)	.....	.....	95,745	114,773
Pumped wells	17,504	5,437	12,067	221.9	19,938	24,763
Flowing wells	1,671	3,227	−1,556	−48.2	2,843	3,654
Flowing and pumped wells	1,490	(2)	.....	.....	1,490	1,794
Lake, gravity	3,442	4,698	−1,256	−26.7	3,979	5,562
Lake, pumped	4,662	6,084	−1,422	−23.4	4,888	6,294
Springs	7,869	4,207	3,662	87.0	9,559	15,393
Stored storm water	129	299	−170	−56.8	141	151
City water	42	(2)	.....	.....	21	52
Stream, gravity, and pumped wells	2,415	(2)	.....	.....	4,069	4,674
Stream, gravity, and flowing wells	441	(2)	.....	.....	443	592
Other mixed	19,027	(2)	.....	.....	27,654	37,491
Other and not reported	62	(2)	.....	.....	67	127

[1] A minus sign (−) denotes decrease. [2] Not included in classification in 1910.

ACREAGE BY CHARACTER OF ENTERPRISE.

The original irrigation district law in Washington was enacted by the first State legislature, in 1890, and it has been amended from time to time since that date. Generally, in Washington, irrigation districts have not built irrigation works, but have been organized to take over works built by other agencies. Some of the larger commercial enterprises reported in 1910 have been taken over by districts, and this accounts for the decrease in the acreage reported for commercial enterprises. Most of the land served by the United States Reclamation Service has been organized into districts, but the acreage is credited to the Reclamation Service because the Government constructed the works and still controls them to a large extent The Reclamation Service also supplies stored water to land in other enterprises under the "Warren Act" (act of Congress, Feb. 21, 1911), and other special arrangements.

The State of Washington accepted the conditions of the Federal Carey Act (act of Congress, Aug. 18, 1894) in 1895, but nothing has been accomplished under this law.

The small acreage credited to the State belongs to State institutions and does not represent a scheme of State construction of irrigation works.

TABLE 5.—ACREAGE CLASSIFIED BY CHARACTER OF ENTERPRISE.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
ACREAGE IRRIGATED.				
Total	529,899	334,378	195,521	58.5
Individual and partnership	142,215	95,655	46,560	48.7
Cooperative	93,192	81,122	12,070	14.9
Irrigation district	79,918	.....	79,918	.....
Commercial	21,705	66,911	−45,206	−67.6
U. S. Reclamation Service	[2] 122,869	55,690	67,179	120.6
U. S. Indian Service	69,510	35,000	34,510	98.6
State	200	(3)	200	.....
Other and mixed	290	(3)	290	.....
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	637,151	470,514	166,637	35.4
Individual and partnership	169,457	117,145	52,312	44.6
Cooperative	104,699	90,805	13,894	15.3
Irrigation district	118,009	.....	118,009	.....
Commercial	31,652	138,064	−106,412	−77.1
U. S. Reclamation Service	[2] 135,119	74,500	60,619	81.4
U. S. Indian Service	77,710	50,000	27,710	55.4
State	200	(3)	200	.....
Other and mixed	305	(3)	305	.....
ACREAGE IN ENTERPRISES.				
Total	836,795	817,032	19,763	2.4
Individual and partnership	226,071	192,310	34,361	17.9
Cooperative	118,539	115,410	3,129	2.7
Irrigation district	134,641	.....	134,641	.....
Commercial	75,292	266,216	−190,924	−71.7
U. S. Reclamation Service	[2] 152,947	143,096	9,851	6.9
U. S. Indian Service	128,200	100,000	28,200	28.2
State	200	(3)	200	.....
Other and mixed	305	(3)	305	.....

[1] A minus sign (−) denotes decrease.
[2] Does not include about 100,000 acres to which stored water is supplied.
[3] Not included in classification in 1910.

ACREAGE BY CHARACTER OF WATER RIGHTS.

Rights to water from streams and other sources are subject to control by the states. The laws of the state of Washington relating to water rights are summarized in the following paragraphs:

The territory of Washington was organized in 1854, and the state of Washington was admitted to the Union in 1889. During the territorial period no general legislation relating to irrigation was enacted.

The constitution of the state, ratified October 1, 1889, declared that "The use of the waters of this state for irrigation, mining, and manufacturing purposes shall be deemed a public use."—(Art. XXI.)

The first state legislature enacted a law requiring each party claiming any right to water to file with the clerk of the district court before June 1, 1890, a sworn statement of his claim; and requiring also that any party wishing to take water from a stream or lake after the passage of the law should file a statement and a map setting forth his claim. This law was in effect until 1917.

The law just referred to, enacted by the first legislature, provided that after June 1, 1890, any party interested might apply to the superior court of the county to have the rights to water from any source adjudicated, and that on such application the court should proceed with the adjudication, if he should "deem it practicable." A law approved March 17, 1917, provided a new procedure for the adjudication of water rights. Water rights may also be defined in ordinary suits between rival claimants.

The law of March 17, 1917, provided that any party wishing to acquire a right to water must make application to the state hydraulic engineer for a permit. When work has been completed in accordance with a permit issued by the state hydraulic engineer, that official issues a certificate setting forth the right that has been acquired.

The irrigation law passed by the first state legislature provided that riparian owners were entitled to use any water, not otherwise appropriated, for the purpose of irrigation "to the full extent of the soil for agricultural purposes," and that riparian rights might be condemned.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED.

CLASS.	1919		1909
	Acres.	Per cent of total.	Per cent of total.
Total	529,899	100.0	96.6
Appropriation and use	196,700	37.1	54.5
Notice filed and posted	169,831	32.0	29.3
Adjudicated by court	56,309	10.6	7.6
Permit from state	39,908	7.5	(1)
Certificate or license from state	17,406	3.3	(1)
Riparian rights	17,095	3.2	5.2
Underground	20,859	3.9	(2)
Other and mixed	561	0.1	(2)
Not reported	11,530	2.2	(2)

[1] In 1910 there was no provision of law for permits or certificates from the state. Small areas were incorrectly reported in these classes.
[2] This class was not included in the tabulation for 1909. All land for which the class of water rights was not reported was included in "Appropriation and use."

ACREAGE BY DRAINAGE BASINS.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributary streams were included in those reported for the main streams. This area is so small, however, that the comparison of the areas reported for the tributary streams is not seriously affected.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASINS.

DRAINAGE BASIN.	ACREAGE IRRIGATED.			Acreage in enterprises, 1920.[2]	Acreage enterprises were capable of irrigating in 1920.[2]
	1919	1902	Per cent increase.[1]		
The state	529,899	154,962	242.0	836,795	637,151
Columbia River and tributaries	521,462	[3] 153,037	238.8	816,266	621,458
Columbia River direct	24,471	584	(4)	49,209	32,492
Clark's Fork	306	(5)	.....	1,431	1,064
Colville River	6,960	310	(4)	18,200	13,993
Spokane River	16,453	210	(4)	40,391	21,675
Okanogan River and tributaries	20,583	2,257	812.0	42,042	30,261
Okanogan River direct	2,357	14	(4)	3,708	2,899
Salmon Creek	6,729	1,095	514.5	11,478	11,238
Other tributaries, Okanogan River	11,497	[3] 1,148	901.5	26,856	16,124
Methow River	12,579	1,675	651.0	24,017	16,529
Entiat River	2,054	2,910	—29.6	2,652	2,251
Wenatchee River	23,734	3,285	622.5	39,288	34,668
Crab Creek	6,088	1,937	214.3	10,400	8,048
Yakima River and tributaries	337,293	121,705	177.1	436,797	353,044
Yakima River direct	254,262	66,371	283.1	345,373	269,163
Wilson Creek	11,297	6,613	70.8	12,042	11,807
Naches River	19,804	20,232	—1.8	21,656	20,284
Atanum River	9,287	3,849	141.3	9,982	9,342
Other tributaries, Yakima River	42,583	[3] 24,640	72.8	47,744	43,048
Snake River and tributaries	11,788	4,968	137.3	36,295	30,269
Snake River direct	4,047	100	(4)	24,233	20,130
Grande Ronde River	66	(5)	.....	138	126
Asotin Creek	3,051	3,225	—5.4	4,051	4,051
Pataha River	1,480	619	139.1	2,302	2,209
Palouse River	1,735	508	241.5	3,045	2,020
Other tributaries, Snake River	1,409	[3] 516	173.1	1,866	1,733
Walla Walla River	22,270	6,328	251.9	36,157	23,965
Klickitat River	12,332	372	(4)	19,241	13,440
White Salmon River	6,247	912	585.0	11,958	7,277
Other tributaries, Columbia River	18,304	[3] 6,475	182.7	48,188	25,982
Independent streams	8,437	1,025	723.1	20,529	15,693
Dungeness River	6,160	685	799.3	12,660	9,860
McDowell Creek	.....	200	.....	.....	.....
Other independent streams	2,277	[3] 140	(4)	7,869	5,833

[1] A minus sign (—) denotes decrease.
[2] Not reported in 1902.
[3] Includes springs and wells.
[4] More than 1,000 per cent.
[5] Not reported separately.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.
1920	$29,299,011	80.6	$45.98	33.4
1910	16,219,149	841.7	34.47	185.3
1900	1,722,369	775.8	12.71	215.4
1890	196,660	.....	4.03	.....

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE.	Amount.	Per cent of total.	Average per acre.
Total	$29,299,011	.....	$45.98
Before 1860	37,986	0.1	47.13
1860–1869	16,174	0.1	18.23
1870–1879	104,885	0.4	4.44
1880–1889	1,130,394	3.9	16.49
1890–1899	4,883,571	16.7	33.54
1900–1904	2,907,222	9.9	59.17
1905–1909	12,527,690	42.8	57.67
1910–1914	5,097,725	19.5	112.19
1915–1919	1,993,364	6.6	51.41

TABLE 10.—CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE, CLASSIFIED BY SOURCE OF WATER SUPPLY.

NOTE.—When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.

CLASS.	CAPITAL INVESTED.			OPERATION AND MAINTENANCE.	
	Amount.	Per cent of total.	Average per acre.	Acreage for which cost is reported.	Average cost per acre.
Total	$29,299,011	.....	$45.98	465,758	3.45
Stream, gravity	19,305,396	65.9	46.32	308,899	2.49
Stream, pumped	2,677,946	9.2	54.05	23,129	11.16
Stream, pumped and gravity	3,933,461	13.4	41.08	92,574	1.99
Wells, pumped	1,678,581	5.7	84.19	16,158	12.71
Wells, flowing	117,546	0.4	41.35	1,076	2.03
Wells, flowing and pumped	58,123	0.2	95.87	1,490	1.86
Lake, pumped	468,616	1.6	39.01	2,976	13.05
Lake, gravity	265,101	0.9	54.49	4,371	3.96
Springs	520,899	1.8	66.63	4,857	7.08
Stored storm water	5,985	(1)	42.45	65	11.85
City water	381	(1)	18.14	.....	.....
Stream, gravity, and wells pumped	243,642	0.8	59.88	2,158	20.70
Stream, gravity, and wells flowing	23,334	0.1	52.67	342	4.97

[1] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, 1920 AND 1902, CLASSIFIED BY DRAINAGE BASINS.

DRAINAGE BASIN.	1920	1902	INCREASE.	
			Amount.	Per cent.
Total	$29,299,011	$2,330,758	$26,968,253	(1)
Columbia River and tributaries.	28,990,618	2,319,513	26,671,105	(1)
Columbia River direct	2,229,066	5,200	2,223,866	(1)
Clarks Fork	7,293	(2)	.....	.....
Colville River	486,747	938	485,809	(1)
Spokane River	1,637,743	2,994	1,634,749	(1)
Okanogan River and tributaries	2,259,018	12,374	2,246,644	.....
Okanogan River direct	227,290	360	226,930	(1)
Salmon Creek	1,060,972	5,085	1,064,887	(1)
Other tributaries of Okanogan River	961,756	[3] 6,929	954,827	(1)
Methow River	483,809	20,825	462,984	(1)
Entiat River	73,889	17,150	56,739	330.8
Wenatchee River	1,868,541	95,755	1,772,786	(1)
Crab Creek	859,050	5,415	853,635	(1)
Yakima River and tributaries	14,849,689	1,968,555	12,881,134	654.3
Yakima River direct	13,912,727	1,580,195	12,332,532	780.4
Wilson Creek	45,875	17,925	27,950	155.9
Nachoz River	458,027	276,223	181,804	65.8
Atanum River	88,443	14,950	73,493	491.6
Other tributaries of Yakima River	344,617	[3] 79,262	265,355	334.8
Snake River and tributaries.	1,398,296	109,853	1,288,443	.....
Snake River direct	471,772	1,080	470,692	(1)
Grande Ronde	5,562	(2)	.....	.....
Asotin Creek	606,084	94,100	511,984	544.1
Pataha River	47,085	1,905	45,180	(1)
Palouse River	175,100	2,810	172,290	(1)
Other tributaries of Snake River	92,693	[3] 9,958	82,735	830.8
Walla Walla River	890,980	27,022	863,958	(1)
Kickitat River	64,423	1,882	62,541	(1)
White Salmon River	91,786	6,700	85,086	(1)
Other tributaries of Columbia River	1,790,288	44,850	1,745,438	(1)
Independent streams	308,393	11,245	297,148	(1)
Dungeness River	94,010	8,000	86,010	(1)
McDowell Creek	.....	2,000	.....	.....
Other independent streams.	214,383	[3] 1,245	213,138	(1)

[1] More than 1,000 per cent. [2] Includes springs and wells.
[3] Not reported separately in 1902.

In classifying capital invested by type of enterprise (Table 12) the average capital invested per acre is not presented, for the reason that it is not possible to compute this correctly. The United States Reclamation Service supplies stored water to enterprises controlled by agencies of most of the other classes shown in the table and a part of its expenditure is properly chargeable to those lands; but it is not possible to tell how much should be so charged or how it should be distributed among the various classes.

TABLE 12.—CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE, CLASSIFIED BY CHARACTER OF ENTERPRISE.

NOTE.—When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.

CLASS.	CAPITAL INVESTED.		OPERATION AND MAINTENANCE.	
	Amount.	Per cent of total.	Acreage for which cost is reported.	Average cost per acre.
Total	$29,299,011	100.0	465,758	3.45
Individual and partnership	4,733,970	16.2	84,405	6.02
Cooperative	3,951,207	13.5	87,791	2.38
Irrigation district	6,114,035	20.9	79,618	5.73
Commercial	2,342,028	8.0	21,585	5.96
U. S. Reclamation Service	10,444,717	35.6	122,849	1.89
U. S. Indian Service	1,657,386	5.6	69,510	1.03
State	55,668	0.2	.....	.....

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE.

Number of enterprises reporting land drained or needing drainage	103
Acreage included in enterprises reporting land drained or needing drainage	218,763
Acreage for which drains have been installed	79,168
Additional acreage needing drainage	43,461
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	36.2
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	9.5
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	14.6

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume entering canals.....second-feet	8,827	4,827	4,000
Acreage irrigated in 1919.....acres	376,270	280,363	95,907
Average number of acres per second-foot	43	58	24
Total quantity entering canals..acre-feet	2,168,318	1,513,616	655,202
Acreage irrigated in 1919.....acres	341,569	264,558	77,011
Average quantity of water per acre..acre-feet	6.3	5.7	8.5
Total quantity of water delivered.....acre-feet	594,479	139,232	455,247
Acreage irrigated in 1919.....acres	174,989	77,235	97,754
Average quantity delivered per acre..acre-feet	3.4	1.8	4.6

IRRIGATION EQUIPMENT.

TABLE 15.—IRRIGATION EQUIPMENT, CLASSIFIED BY DATE OF BEGINNING.

DATE.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	579	115	1,873	16,242	3,851	3,179	1,764	205	477,789
Before 1860	1		6	11	3				
1860–1869	5		12	51	14				
1870–1879	33		92	512	120	56	4		
1880–1889	58	7	234	2,243	429	85	4	1	10
1890–1899	122	21	321	3,993	550	138	63	8	1,510
1900–1904	78	11	241	1,814	392	1,466	325	25	861
1905–1909	91	30	232	3,099	529	167	37	20	4,752
1910–1914	53	25	234	1,235	316	729	1,172	59	68,191
1915–1919	43	11	166	1,241	256	348	57	55	390,416
Not reported	95	10	335	1,143	1,242	144	79	30	10,840
						46	23	7	1,200

DATE.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	790.0	60	14,925	520	227,744	975	22,929	1,059	636,552	60
Before 1860	1.7			2	1,050	3	72	3	980	
1860–1869	.5									
1870–1879	1.1			2	500	3	20	3	1,000	
1880–1889	16.0			1	470	7	116	9	5,230	
1890–1899	63.8	7	1,150	14	2,265	31	278	33	25,105	
1900–1904	44.1	4	1,075	21	5,886	50	757	50	16,819	
1905–1909	373.3	3	1,000	72	63,736	148	12,411	190	302,486	
1910–1914	143.5	17	1,980	186	83,117	316	4,705	344	131,465	
1915–1919	109.9	8	5,460	142	36,585	286	3,332	297	106,929	
Not reported	36.1	21	4,260	80	34,135	131	1,238	130	46,538	

TABLE 16.—IRRIGATION EQUIPMENT, CLASSIFIED BY CHARACTER OF ENTERPRISE.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	579	115	1,873	16,242	3,851	3,179	1,764	205	477,789
Individual and partnership	498	87	1,694	6,611	2,578	2,307	229	171	4,047
Cooperative	48	8	108	2,777	522	250	272	10	12,050
Irrigation district	20	3	35	2,347	424	232	130	5	7,984
Commercial	6	8	14	1,061	118	12	50	9	9,607
U. S. Indian Service	3	1	9	1,720	83	26	192	1	3,500
U. S. Reclamation Service	3	8	11	1,716	124	350	890	7	440,000
State								2	1
Other and not reported	1		2	10	2	2	1		

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	790.0	60	14,925	520	227,744	975	22,929	1,059	636,552	60
Individual and partnership	355.5	60	14,925	484	164,586	914	10,290	965	347,349	
Cooperative	131.3			26	60,138	29	4,048	40	97,138	
Irrigation districts	93.5			1	1,500	14	3,935	23	31,295	
Commercial	73.3			6	870	10	1,771	11	78,520	
U. S. Indian Service	2.3									
U. S. Reclamation Service	129.4					4	2,735	14	62,200	
State	2.8			3	650	2	85	4	18,650	
Other and not reported	1.9					2	65	2	1,400	

TABLE 17.—IRRIGATION EQUIPMENT, CLASSIFIED BY DRAINAGE BASINS.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	579	115	1,873	16,242	3,851	3,179	1,764	205	477,789
Columbia River and tributaries	570	113	1,858	15,607	3,801	3,086	1,718	198	477,785
Columbia River direct	9	18	95	330	154	174	44	38	1,529
Clarks Fork River	5	1	23	99	12	1		3	50
Colville River	40	1	101	393	174	131	21	3	
Spokane River	15	8	61	802	101	74	134	31	5,662
Okanogan River and tributaries	12	11	124	552	158	69	132	19	24,136
Okanogan River direct	1	3	39	45	24	25	4	8	2,211
Salmon Creek (Conconully)	1	3	15	143	32	3	67	5	16,550
Other tributaries of Okanogan River	10	5	70	364	102	41	61	6	5,375
Methow River	52	11	166	1,230	231	59	45	19	209
Entiat River	5	1	32	85	41				
Wenatchee River	41	6	87	553	195	66	18	8	2,000
Crab Creek	24	9	67	100	34	18	9	10	4,501
Yakima River and tributaries	105	10	459	7,386	1,070	477	1,156	10	423,810
Yakima River direct	12	7	88	4,823	473	446	1,079	7	423,800
Wilson Creek	20		50	163	62	6	5	1	10
Naches River	2		63	724	113	7	21		
Atanum River	10		49	180	82	3	1		
Other tributaries of Yakima River	61	3	209	1,596	340	15	50	2	
Snake River and tributaries	48	9	115	1,075	120	261	17	9	107
Snake River direct	1	2	25	427	36	187	5	4	3
Grande Ronde River	4		7	11	8				
Asotin Creek	2	1	1	1		1		1	100
Pataha River	10		33	377	24	31	1	1	
Palouse River	13	5	21	219	31	42	11	2	4
Other tributaries of Snake River	18	1	28	40	21			1	
Walla Walla River	135	7	242	1,049	1,065	1,574	93	4	
Klickitat River	19		30	352	66	17	4		
White Salmon River	19	3	28	478	99	21	15	3	
Other tributaries of Columbia River	41	18	228	723	281	144	30	41	15,781
Independent streams	9	2	15	635	50	93	46	7	4
Dungeness River	6		7	570	36	75	32		
Other independent streams	3	2	8	65	14	18	14	7	4

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	790.0	60	14,925	520	227,744	975	22,929	1,059	636,552	60
Columbia River and tributaries	785.9	59	14,925	517	227,624	969	22,901	1,050	635,735	
Columbia River direct	162.2	8	4,390	166	58,223	323	6,450	347	231,463	67
Clarks Fork	1.0									
Colville River	14.6			1	40	5	23	5	8,450	55
Spokane River	132.7			47	58,504	83	3,476	93	68,643	79
Okanogan River and tributaries	20.9			48	13,278	111	1,599	119	47,993	
Okanogan River direct	14.9			44	12,428	97	930	104	38,258	40
Salmon Creek (Conconully)	.6					5	607	6	7,385	58
Other tributaries of Okanogan River	5.4			4	850	9	62	9	2,350	26
Methow River	4.8	1		2	115	9	44	9	1,318	56
Entiat River	1.5					4	18	4	310	59
Wenatchee River	26.0			7	1,300	40	337	38	21,114	67
Crab Creek	34.9	3	60	111	38,285	137	2,321	147	66,270	65
Yakima River and tributaries	161.1	3	285	45	9,680	74	3,492	87	78,975	
Yakima River direct	154.6	3	285	41	7,870	66	3,447	78	75,715	39
Wilson Creek	1.0									
Naches River	4.1			1	335	2	8	3	1,285	55
Atanum River				1	125	1	2	1	125	18
Other tributaries of Yakima River	1.4			2	1,350	5	35	5	1,850	18
Snake River and tributaries	94.1	8	1,100	37	13,365	65	3,559	74	47,849	
Snake River direct	33.6			35	13,015	50	3,186	58	33,177	46
Grande Ronde River										
Asotin Creek	48.0									
Pataha River	1.0			2	350	3	37	3	3,250	53
Palouse River	1.4	8	1,100			2	40	3	4,400	16
Other tributaries of Snake River	10.1					9	296	10	7,022	52
Walla Walla River	56.4	33	6,080	36	32,510	53	681	62	20,840	21
Klickitat River	2.5					5	26	5	3,875	28
White Salmon River	2.5			2	24	4	42	4	320	83
Other tributaries of Columbia River	70.7	3	3,010	15	4,300	54	832	56	38,315	97
Independent streams	4.1	1		3	120	9	28	9	817	54
Dungeness River	1.0									
McDowell Creek	3.1									
Other independent streams		1		3	120	9	28	9	817	54

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATE.

[NOTE.—Totals for the state, used in making comparisons, are reported in state bulletin on agriculture.]

	CROP.	ACRES HARVESTED.					QUANTITY HARVESTED.					
		1919		1909				1919		1909		
		Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]	Unit.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]
	Cereals:											
1	Corn	13,263	38.1	2,464	9.5	438.3	Bu.	487,154	54.0	87,357	15.5	457.6
2	Oats	7,215	3.8	6,690	2.5	7.8	Bu.	337,056	4.2	330,587	2.5	2.0
3	Winter wheat	8,236	0.7	6,720	0.3	553.7	Bu.	154,116	0.6	188,855	0.5	70.6
4	Spring wheat	35,094	2.7				Bu.	923,493	5.4			
5	Barley	5,761	6.8	1,738	1.0	231.5	Bu.	193,568	8.6	49,143	0.8	293.9
6	Rye	544	1.3				Bu.	5,646	2.4			
	Hay and forage:											
7	Timothy alone	8,142	16.1	17,326	19.6	−53.0	Tons.	15,466	19.5	33,642	23.5	−54.0
8	Timothy and clover mixed	8,647	6.0	7,704	6.4	12.2	Tons.	18,140	5.9	20,991	8.3	−13.6
9	Clover alone	2,254	12.7	794	7.3	183.9	Tons.	4,128	11.1	2,136	9.7	93.2
10	Alfalfa	148,409	64.9	74,496	78.5	99.2	Tons.	494,066	75.3	296,614	82.9	66.6
11	Other tame grasses	17,014	32.7	1,054	3.6	[2]	Tons.	35,054	38.6	1,625	3.8	[2]
12	Grains cut green	11,650	2.4	5,340	1.5	118.2	Tons.	15,214	2.8	9,417	1.9	61.6
13	Wild, salt, or prairie grasses	1,047	3.5	2,800	9.9	−62.6	Tons.	2,075	6.2	4,891	16.0	−57.6
14	Corn cut for forage	2,001	8.1	[3]			Tons.	6,046	14.8	[3]		
15	Silage crops	2,645	11.7	[3]			Tons.	23,762	15.3	[3]		
16	Root crops for forage	628	8.5	[3]			Tons.	2,619	3.9	[3]		
	Vegetables:											
17	Potatoes	8,186	14.8	9,178	15.9	−10.8	Bu.	1,526,353	26.0	1,532,915	20.0	−0.4
18	Sugar beets	4,635	86.4	246	19.4	[2]	Tons.	40,286	86.8	244	3.7	[2]
	Fruits:											
19	Grapes	[4] 118,892	25.4	[3]			Lbs.	1,410,072	35.6	[3]		
20	Apples	[5] 4,633,119	58.2	[3]			Bu.	15,823,446	70.4	[3]		
21	Peaches	[5] 455,526	70.2	[3]			Bu.	1,269,176	81.5	[3]		
22	Pears	[5] 530,834	61.2	[3]			Bu.	1,236,380	71.5	[3]		
23	Plums and prunes	[5] 75,084	8.6	[3]			Bu.	127,042	16.2	[3]		
	Miscellaneous:											
24	Red clover seed	897	77.3				Bu.	3,925	89.2			
25	Hops	507	44.9	[3]			Lbs.	870,769	53.9	[3]		

	CROP.	AVERAGE YIELD PER ACRE.						VALUE.				
		Unit.	For state.	On non-irrigated land.	On irrigated land.			1919		1909		
					Average.	Per cent of average for state.	Per cent of average on non-irrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	Per cent of increase.[1]
	Cereals:											
26	Corn	Bu.	25.9	19.2	36.7	141.7	191.1	$876,877	54.0	$65,965	16.3	[2]
27	Oats	Bu.	42.1	41.9	46.7	110.9	111.4	337,056	4.2	163,948	2.8	105.6
28	Winter wheat	Bu.	21.1	21.1	18.0	85.3	85.3	324,201	0.6	173,221	0.5	[2]
29	Spring wheat	Bu.	13.0	12.6	25.9	199.2	205.6	2,013,215	5.4			
30	Barley	Bu.	26.6	26.1	33.6	126.3	128.7	290,352	8.6	30,474	0.9	852.8
31	Rye	Bu.	5.5	5.4	10.4	189.1	192.6	11,292	2.5			
	Hay and forage:											
32	Timothy alone	Tons.	1.6	1.5	1.9	118.8	126.7	463,980	19.5	536,944	24.8	−13.6
33	Timothy and clover mixed	Tons.	2.1	2.1	2.1	100.0	100.0	444,430	5.9	325,758	9.0	36.4
34	Clover alone	Tons.	2.1	2.1	1.8	85.7	85.7	99,072	11.1	25,684	8.7	285.7
35	Alfalfa	Tons.	2.9	2.0	3.3	113.8	143.5	11,857,584	75.3	3,156,699	86.1	275.6
36	Other tame grasses	Tons.	1.7	1.6	2.1	143.5	131.2	735,378	38.1	22,325	3.7	[3]
37	Grains cut green	Tons.	1.1	1.1	1.3	118.2	118.2	418,385	2.8	123,354	2.0	239.2
38	Wild, salt, or prairie grasses	Tons.	1.1	1.1	2.0	181.8	181.8	39,425	6.3	65,124	21.9	−39.5
39	Corn cut for forage	Tons.	1.6	1.5	3.0	187.5	200.0	78,598	14.8			
40	Silage crops	Tons.	6.9	6.6	9.0	130.4	136.4	261,382	15.3			
41	Root crops for forage	Tons.	9.0	9.5	4.2	46.7	44.2	55,104	3.9			
	Vegetables:											
42	Potatoes	Bu.	106.4	92.4	186.4	175.2	201.7	3,205,341	26.0	505,887	16.9	533.6
43	Sugar beets	Tons.	8.6	8.4	8.7	101.2	103.6	435,089	86.8	1,755	4.6	[2]
	Fruits:											
44	Grapes	Lbs.	[6] 8.5	[6] 7.3	[6] 11.9	140.0	163.0	112,806	35.6	[3]		
45	Apples	Bu.	[7] 2.8	[7] 2.0	[7] 3.4	121.4	170.0	13,697,378	46.9	[3]		
46	Peaches	Bu.	[7] 2.4	[7] 1.5	[7] 2.8	116.7	186.7	2,707,228	81.5	[3]		
47	Pears	Bu.	[7] 2.0	[7] 1.5	[7] 2.3	115.0	153.3	580,118	19.2	[3]		
48	Plums and prunes	Bu.	[7] .9	[7] .8	[7] 1.7	188.9	212.5	247,732	16.2	[3]		
	Miscellaneous:											
49	Red clover seed	Bu.	3.8	1.8	4.4	115.8	244.4	117,750	89.2	[3]		
50	Hops	Lbs.	1,431.1	1,197.7	1,717.5	120.0	143.4	391,846	53.9	[3]		

[1] A minus sign (−) denotes decrease.
[2] More than 1,000 per cent.
[3] Not separately reported in 1909.
[4] Number of vines of bearing age.
[5] Number of trees of bearing age.
[6] Yield per vine.
[7] Yield per tree.

COUNTY TABLE.—ACREAGE IRRIGATED AND INCLUDED IN ENTERPRISES, IRRIGATION EQUIPMENT AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, BY COUNTIES: 1919 AND 1920.

[A minus sign (—) denotes decrease.]

		THE STATE.	Adams.	Asotin.	Benton.	Chelan.	Clallam.	Columbia.
1	Number of all farms in 1920	66,318	1,084	578	1,549	2,095	607	622
2	Number of farms irrigated in 1919	13,271	8	279	1,294	1,704	125	93
3	Per cent of all farms	20.0	0.7	48.3	83.5	81.3	20.6	15.0
4	Number of farms irrigated in 1909	7,664	20	238	768	1,189	77	56
5	Per cent of increase, 1909–1919	73.2	—60.0	17.2	68.5	43.3	62.3	66.1
	LAND AND FARM AREA.							
6	Total land area—acres	42,775,040	1,223,680	387,840	1,069,440	1,856,000	1,104,640	549,120
7	Land in farms—acres	13,219,053	937,711	259,233	371,811	235,621	58,043	326,330
8	Improved land in farms—acres	7,129,343	727,876	96,404	201,078	65,810	20,132	192,613
9	Acreage irrigated in 1919	529,899	943	3,474	39,272	38,894	6,160	2,168
10	Per cent of improved land in farms	7.4	0.1	3.6	19.5	59.1	30.6	1.1
11	Acreage irrigated in 1909	334,378	1,523	3,179	23,437	23,620	4,265	2,174
12	Per cent of increase, 1909–1919	58.5	—38.1	9.3	67.6	64.7	44.4	—0.3
13	Acreage enterprises were capable of irrigating in 1920	637,151	1,342	4,559	48,851	50,502	9,860	3,063
14	Acreage enterprises were capable of irrigating in 1910	470,514	1,655	5,373	50,653	27,970	4,405	2,797
15	Per cent of increase, 1910–1920	35.4	—18.9	—15.1	—3.6	80.5	123.8	9.5
16	Acreage included in enterprises in 1920	836,795	1,737	4,684	72,015	65,324	12,660	3,532
17	Acreage included in enterprises in 1910	817,032	5,123	9,844	87,384	53,497	9,975	3,922
18	Per cent of increase, 1910–1920	2.4	—66.1	—52.4	—17.6	22.1	26.9	—9.9
19	Acreage of irrigated land reported as available for settlement	61,738	.....	.....	15,756	3,750	2,500	.....
	IRRIGATION EQUIPMENT.							
	Independent enterprises:							
20	Number, 1920	2,692	26	21	146	379	7	52
21	Number, 1910	1,934	19	22	74	260	7	42
	Main ditches:							
22	Number, 1920	1,873	27	17	30	207	7	43
23	Number, 1910	1,600	12	18	50	227	7	43
24	Length, 1920—miles	3,851	19	16	151	394	36	36
25	Length, 1910—miles	2,594	24	40	130	357	17	36
26	Capacity, 1920—second-feet	16,242	203	39	982	1,100	570	697
27	Capacity, 1910—second-feet	13,178	185	76	1,099	1,219	281	211
	Laterals:							
28	Number, 1920	3,179	27	1	111	89	75	44
29	Number, 1910	1,180	8	10	70	132	19	30
30	Length, 1920—miles	1,764	8	.....	185	30	32	15
31	Length, 1910—miles	1,298	7	64	119	122	19	4
	Reservoirs:							
32	Number, 1920	205	4	1	.....	36	.....	1
33	Number, 1910	156	1	3	2	36	.....	.....
34	Capacity, 1920—acre-feet	477,789	4	100	.....	11,481	.....	1
35	Capacity, 1910—acre-feet	121,543	10,000	1,160	.....	12,748	.....	.....
	Flowing wells:							
36	Number, 1920	60	6	.....	7	1	.....	.....
37	Number, 1910	55	.....	.....	4	.....	.....	.....
38	Capacity, 1920—gallons per minute	14,925	160	.....	6,200	10	.....	.....
39	Capacity, 1910—gallons per minute	18,926	.....	.....	1,290	.....	.....	.....
	Pumped wells:							
40	Number, 1920	520	7	.....	101	13	.....	4
41	Number, 1910	128	5	.....	31	8	.....	1
42	Capacity, 1920—gallons per minute	227,744	5,160	.....	38,807	1,775	.....	130
43	Capacity, 1910—gallons per minute	60,220	1,873	.....	10,158	564	.....	1,500
	Pumping plants:							
44	Number, 1920	978	12	1	144	138	.....	7
45	Number, 1910	391	8	1	84	54	.....	3
46	Engine capacity, 1920—horsepower	22,929	143	5	4,555	1,415	.....	23
47	Engine capacity, 1910—horsepower	13,847	133	2	5,894	2,624	.....	58
48	Pump capacity, 1920—gallons per minute	636,552	10,012	200	163,628	45,853	.....	355
49	Pump capacity, 1910—gallons per minute	365,411	3,223	42	147,059	14,777	.....	1,620
50	Average lift, 1920—feet	60	28	8	37	86	.....	18
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920—dollars	29,299,011	77,350	627,165	2,387,113	3,503,670	94,010	61,447
52	Capital invested to July 1, 1910—dollars	16,219,149	171,946	1,662,958	3,211,493	889,152	18,900	16,027
53	Per cent of increase, 1910–1920	80.6	—55.0	—62.3	—25.7	294.0	397.4	283.4
54	Average cost per acre based on acreage enterprises were capable of supplying with water in 1920—dollars	45.98	57.64	137.57	48.86	69.38	9.53	20.06
55	Average cost per acre in 1910 based on acreage enterprises were capable of supplying with water in 1910—dollars	34.47	103.89	309.50	63.40	31.78	4.29	5.73
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920—dollars	37,684,591	87,750	627,165	3,040,479	4,080,090	97,010	64,947
57	Estimated final cost of existing enterprises in 1910—dollars	22,322,856	171,946	1,662,958	3,565,877	1,340,835	18,900	16,027
58	Per cent of increase, 1910–1920	68.8	—49.0	—62.3	—14.7	204.3	413.3	305.2
59	Average cost per acre based on estimated final cost and acreage included in enterprises in 1920—dollars	45.03	50.52	133.90	42.22	62.46	7.66	18.39
60	Average cost per acre based on estimated final cost and acreage included in enterprises in 1910—dollars	27.32	33.56	168.93	40.81	25.06	1.89	4.09

COUNTY TABLE.—ACREAGE IRRIGATED AND INCLUDED IN ENTERPRISES, IRRIGATION EQUIPMENT, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, BY COUNTIES: 1919 AND 1920—Continued.

[A minus sign (–) denotes decrease.]

		Douglas.	Ferry.	Franklin.	Garfield.	Grant.	Kittitas.	Klickitat.	Lincoln.
1	Number of all farms in 1920	1,623	730	414	413	1,110	928	1,177	1,860
2	Number of farms irrigated in 1919	314	61	78	25	185	737	164	83
3	Per cent of all farms	19.3	8.4	18.8	6.0	16.7	79.4	13.9	4.5
4	Number of farms irrigated in 1909	146	20	21	54	49	639	189	77
5	Per cent of increase, 1909–1919	115.1	205.0	271.4	–53.7	277.6	15.3	–3.0	7.8
	LAND AND FARM AREA.								
6	Total land area—acres	1,143,680	1,420,800	771,840	444,160	1,740,800	1,490,560	1,168,000	1,473,280
7	Land in farms—acres	892,223	162,888	456,056	314,182	743,518	215,918	562,331	1,329,405
8	Improved land in farms—acres	567,335	36,618	255,636	159,252	413,768	95,984	190,616	832,673
9	Acreage irrigated in 1919	4,822	791	2,253	883	7,545	81,967	18,978	2,221
10	Per cent of improved land in farms	0.8	2.2	0.9	0.6	1.8	85.4	10.0	0.3
11	Acreage irrigated in 1909	3,317	397	830	1,316	3,230	68,892	4,681	2,217
12	Per cent of increase, 1909–1919	45.4	99.2	171.4	–32.9	133.6	19.0	305.4	0.2
13	Acreage enterprises were capable of irrigating in 1920	4,938	2,253	10,014	1,552	9,302	83,552	21,360	2,838
14	Acreage enterprises were capable of irrigating in 1910	8,365	4,258	1,276	1,728	8,501	72,348	7,461	2,404
15	Per cent of increase, 1910–1920	–41.0	–47.1	684.8	–10.2	9.4	15.5	186.3	18.1
16	Acreage included in enterprises in 1920	8,756	7,421	14,268	1,698	12,806	87,775	32,315	3,291
17	Acreage included in enterprises in 1910	12,826	5,271	2,113	2,283	14,456	92,940	18,590	2,935
18	Per cent of increase, 1910–1920	–31.7	40.8	575.2	–25.6	–11.4	–5.6	73.8	12.1
19	Acreage of irrigated land reported as available for settlement	1,603	.....	10,500	.....	.....	.....	500	.....
	IRRIGATION EQUIPMENT.								
	Independent enterprises:								
20	Number, 1920	86	45	48	36	172	223	93	54
21	Number, 1910	45	20	21	47	43	257	115	48
	Main ditches:								
22	Number, 1920	14	30	4	26	79	212	67	37
23	Number, 1910	33	20	8	42	23	206	87	41
24	Length, 1920—miles	15	31	8	17	37	389	173	24
25	Length, 1910—miles	31	24	7	41	41	387	108	31
26	Capacity, 1920—second-feet	48	119	121	97	113	1,788	842	63
27	Capacity, 1910—second-feet	49	129	44	120	87	1,530	506	92
	Laterals:								
28	Number, 1920	20	6	25	2	29	25	38	62
29	Number, 1910	26	4	.....	5	22	143	65	24
30	Length, 1920—miles	11	1	2	1	8	41	19	7
31	Length, 1910—miles	8	1	.....	1	17	56	23	3
	Reservoirs:								
32	Number, 1920	8	2	2	1	18	7	18	1
33	Number, 1910	4	1	.....	2	10	3	11	3
34	Capacity, 1920—acre-feet	.....	151	2	.....	4,519	384,810	415	.....
35	Capacity, 1910—acre-feet	39	700	.....	1	84	35,000	12	.....
	Flowing wells:								
36	Number, 1920	2	1	.....	.....	.....	.....	.....	.....
37	Number, 1910	2	.....	.....	.....	2	.....	1	.....
38	Capacity, 1920—gallons per minute	190	1,000	.....	.....	.....	.....	.....	.....
39	Capacity, 1910—gallons per minute	25	.....	.....	.....	7	.....	14	.....
	Pumped wells:								
40	Number, 1920	22	3	31	1	132	1	2	9
41	Number, 1910	1	1	5	.....	14	.....	12	5
42	Capacity, 1920—gallons per minute	6,865	1,000	13,080	250	39,779	200	24	3,785
43	Capacity, 1910—gallons per minute	850	13	1,845	.....	2,606	.....	278	450
	Pumping plants:								
44	Number, 1920	55	3	50	8	164	9	13	20
45	Number, 1910	18	2	22	5	26	3	19	8
46	Engine capacity, 1920—horsepower	1,452	9	1,100	242	3,084	193	104	361
47	Engine capacity, 1910—horsepower	406	12	298	90	417	207	45	184
48	Pump capacity, 1920—gallons per minute	38,760	153	36,478	7,750	76,924	12,575	6,100	11,805
49	Pump capacity, 1910—gallons per minute	12,713	278	12,335	2,660	23,785	11,700	919	3,170
50	Average lift, 1920—feet	95	12	48	76	79	24	46	63
	CAPITAL INVESTED.								
51	Capital invested to Jan. 1, 1920—dollars	382,390	66,050	362,390	32,700	1,192,739	4,678,707	198,501	87,431
52	Capital invested to July 1, 1910—dollars	488,941	37,406	36,561	23,503	166,510	681,168	73,434	28,434
53	Per cent of increase, 1910–1920	–21.8	76.6	891.2	39.1	616.3	586.9	170.3	207.5
54	Average cost per acre based on acreage enterprises were capable of supplying with water in 1920—dollars	77.44	29.32	36.19	21.07	128.22	56.00	9.29	30.81
55	Average cost per acre in 1910 based on acreage enterprises were capable of supplying with water in 1910—dollars	58.45	8.78	28.65	13.60	19.59	9.42	9.84	11.83
	ESTIMATED FINAL COST.								
56	Estimated final cost of existing enterprises in 1920—dollars	402,008	66,050	637,390	36,000	1,301,720	5,908,707	206,851	88,431
57	Estimated final cost of existing enterprises in 1910—dollars	488,941	37,406	36,561	23,503	191,510	681,168	89,434	28,434
58	Per cent of increase, 1910–1920	–17.8	79.0	(1)	53.2	579.7	767.4	131.3	211.0
59	Average cost per acre based on estimated final cost and acreage included in enterprises in 1920—dollars	45.91	9.02	44.67	21.20	101.65	67.32	6.40	26.87
60	Average cost per acre based on estimated final cost and acreage included in enterprises in 1910—dollars	38.12	7.10	17.30	10.29	13.25	7.33	4.81	9.69

(1) More than 1,000 per cent.

COUNTY TABLE.—ACREAGE IRRIGATED AND INCLUDED IN ENTERPRISES, IRRIGATION EQUIPMENT, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, BY COUNTIES: 1919 AND 1920—Continued.

[A minus sign (—) denotes decrease.]

		Okanogan.	Spokane.	Stevens.[1]	Walla Walla.	Whitman.	Yakima.	Other counties.[2]
1	Number of all farms in 1920	2,856	4,830	2,727	1,502	2,957	5,755	30,901
2	Number of farms irrigated in 1919	1,103	775	18	654	14	5,354	203
3	Per cent of all farms	38.6	16.0	0.7	43.5	0.5	93.0	0.6
4	Number of farms irrigated in 1909	397	287	126	273	46	2,951	61
5	Per cent of increase, 1909–1919	177.8	170.0	.....	139.6	—69.6	81.4	.....
	LAND AND FARM AREA.							
6	Total land area—acres	3,341,440	1,123,840	1,603,200	809,600	1,349,120	3,237,760	15,466,240
7	Land in farms—acres	689,796	311,206	472,490	689,257	1,241,496	479,629	1,969,909
8	Improved land in farms—acres	212,497	449,537	130,391	474,161	1,033,579	261,866	701,922
9	Acreage irrigated in 1919	35,899	16,154	8,990	23,575	2,099	230,033	2,778
10	Per cent of improved land in farms	16.9	3.6	6.4	5.0	0.2	87.8	.....
11	Acreage irrigated in 1909	15,238	12,143	3,510	10,008	1,377	148,630	394
12	Per cent of increase, 1909–1919	135.6	33.0	.....	135.6	52.4	54.8	.....
13	Acreage enterprises were capable of irrigating in 1920	52,315	20,995	18,238	39,040	2,536	242,726	7,315
14	Acreage enterprises were capable of irrigating in 1910	31,670	17,140	13,235	20,954	1,705	186,050	557
15	Per cent of increase, 1910–1920	65.2	22.5	.....	86.3	48.7	30.5	.....
16	Acreage included in enterprises in 1920	71,760	39,458	28,605	45,303	4,138	309,235	10,014
17	Acreage included in enterprises in 1910	53,012	52,330	15,510	39,622	3,057	331,455	887
18	Per cent of increase, 1910–1920	35.4	—24.6	.....	14.3	35.4	—6.7	.....
19	Acreage of irrigated land reported as available for settlement	7,995	3,638	575	9,587	.....	3,334	2,000
	IRRIGATION EQUIPMENT.							
	Independent enterprises:							
20	Number, 1920	383	107	199	280	29	252	54
21	Number, 1910	255	55	91	136	36	280	61
	Main ditches:							
22	Number, 1920	306	49	179	237	20	238	35
23	Number, 1910	238	50	91	100	36	242	26
24	Length, 1920—miles	421	94	240	1,089	27	624	30
25	Length, 1910—miles	321	124	133	140	30	564	8
26	Capacity, 1920—second-feet	1,801	782	477	959	48	5,152	191
27	Capacity, 1910—second-feet	1,845	625	374	913	68	3,615	14
	Laterals:							
28	Number, 1920	149	84	181	1,813	19	360	19
29	Number, 1910	171	44	78	68	14	247	.....
30	Length, 1920—miles	186	136	29	79	4	956	20
31	Length, 1910—miles	96	93	10	105	4	540	.....
	Reservoirs:							
32	Number, 1920	49	32	7	5	.....	3	10
33	Number, 1910	38	18	3	10	2	2	7
34	Capacity, 1920—acre-feet	30,789	5,663	800	.....	.....	39,000	54
35	Capacity, 1910—acre-feet	25,727	1,536	20	4	11	34,500	1
	Flowing wells:							
36	Number, 1920	1	.....	.....	33	5	3	1
37	Number, 1910	.....	5	.....	13	.....	27	1
38	Capacity, 1920—gallons per minute	.....	.....	.....	6,080	1,000	285	.....
39	Capacity, 1910—gallons per minute	.....	1	.....	12,502	.....	5,069	18
	Pumped wells:							
40	Number, 1920	52	49	2	45	.....	43	3
41	Number, 1910	2	30	.....	1	.....	9	3
42	Capacity, 1920—gallons per minute	13,613	58,646	45	36,240	.....	8,225	120
43	Capacity, 1910—gallons per minute	188	33,929	.....	4,500	.....	1,382	84
	Pumping plants:							
44	Number, 1920	132	75	9	65	11	51	11
45	Number, 1910	25	32	2	36	6	18	19
46	Engine capacity, 1920—horsepower	1,885	3,316	41	2,775	340	1,735	151
47	Engine capacity, 1910—horsepower	299	1,633	23	1,152	63	270	37
48	Pump capacity, 1920—gallons per minute	54,461	79,688	9,156	25,885	8,434	47,002	1,303
49	Pump capacity, 1910—gallons per minute	9,983	42,646	275	62,987	2,179	11,812	1,248
50	Average lift, 1920—feet	43	83	48	24	56	38	.....
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920—dollars	2,874,338	1,668,838	641,580	990,667	225,933	8,897,058	248,934
52	Capital invested to July 1, 1910—dollars	1,119,447	946,307	244,466	1,166,120	53,720	5,159,024	23,632
53	Per cent of increase, 1910–1920	156.8	76.4	.....	—15.0	320.6	72.4	.....
54	Average cost per acre based on acreage enterprises were capable of supplying with water in 1920—dollars	54.94	79.49	35.18	25.38	89.09	36.65	34.03
55	Average cost per acre in 1910 based on acreage enterprises were capable of supplying with water in 1910—dollars	35.35	55.21	18.47	55.65	31.51	27.73	42.43
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920—dollars	4,797,308	2,699,388	1,002,330	1,340,767	237,533	10,670,024	291,734
57	Estimated final cost of existing enterprises in 1910—dollars	1,229,113	946,307	244,466	1,393,370	53,720	10,078,743	23,632
58	Per cent of increase, 1910–1920	290.3	185.2	.....	—3.8	342.2	5.9	.....
59	Average cost per acre based on estimated final cost and acreage included in enterprises in 1920—dollars	66.85	68.41	35.04	29.60	57.40	34.50	29.13
60	Average cost per acre based on estimated final cost and acreage included in enterprises in 1910—dollars	23.19	18.08	15.76	35.17	17.57	30.41	26.64

[1] Divided in 1911, Pend Oreille County being organized from a part of Stevens County.
[2] Includes Clark, Jefferson, King, Kitsap, Lewis, Pend Oreille, Pierce, Skagit, Skamania, and Thurston, and Whatcom counties. No irrigation is reported for the other counties of the state.

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FOURTEENTH CENSUS OF THE UNITED STATES: 1920

DEPARTMENT OF COMMERCE

BULLETIN

BUREAU OF THE CENSUS

IRRIGATION : WYOMING

STATISTICS FOR THE STATE AND ITS COUNTIES

Prepared under the supervision of WILLIAM LANE AUSTIN, Chief Statistician for Agriculture, by R. P. TEELE, Special Agent in Charge of Irrigation

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INTRODUCTION.

This bulletin presents the statistics of irrigation for the state of Wyoming collected at the census of 1920. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout the bulletin figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

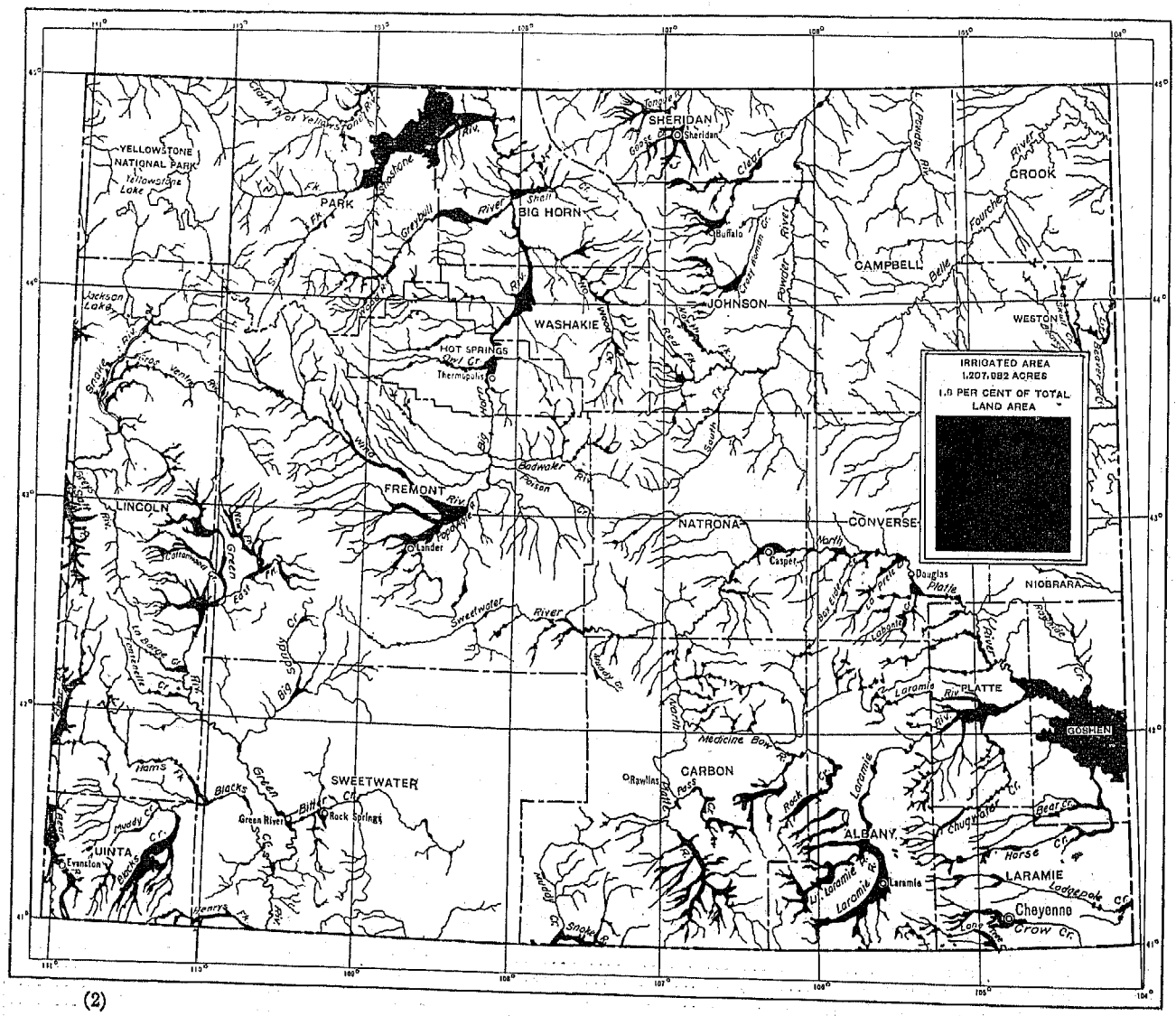
TABLE 1.—SUMMARY FOR THE STATE: 1920 AND 1910.

ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	15,748	10,987	4,761	43.3
Approximate land area of the state.....acres..	62,430,720	62,460,160	−[2] 29,440	([3])
All land in farms.....acres..	11,809,351	8,543,010	3,266,341	38.2
Improved land in farms.....acres..	2,102,005	1,256,160	845,845	67.3
Number of farms irrigated	6,449	6,297	152	2.4
Area irrigated.....acres..	1,207,982	1,133,302	74,680	6.6
Area enterprises were capable of irrigating.....acres..	1,831,039	1,639,510	191,529	11.7
Area included in enterprises.....acres..	2,564,668	2,224,298	340,370	15.3
Per cent irrigated:				
Number of all farms	41.0	57.3	−16.3	.....
Approximate land area of state.....acres..	1.9	1.8	0.1	.....
Land in farms.....acres..	10.2	13.3	−3.1	.....
Improved land in farms.....acres..	57.5	90.2	−32.7	.....
Excess of area enterprises were capable of irrigating over area irrigated.....acres..	623,057	506,208	116,849	23.1
Excess of area included in enterprises over area irrigated.....acres..	1,356,686	1,090,996	265,690	24.4
Area of irrigated land reported as available for settlement.....acres..	197,326	([4])	.....	.....
Capital invested	$34,326,328	$17,700,980	$16,625,348	93.9
Average per acre enterprises were capable of irrigating	$18.75	$10.80	$7.95	73.6
Estimated final cost of existing enterprises	$51,500,288	$20,425,890	$31,074,398	152.1
Average per acre included in enterprises	$20.08	$9.18	$10.90	118.7
Average cost of operation and maintenance per acre	$1.04	$0.86	$0.18	20.9

[1] A minus sign (−) denotes decrease.
[2] Decrease due to building of Pathfinder and Shoshone Reservoirs.
[3] Less than one-tenth of 1 per cent.
[4] Not reported in 1910.

WYOMING

APPROXIMATE LOCATION AND EXTENT OF IRRIGATED LAND.



EXPLANATION OF TERMS.

Farms irrigated.—The number of "farms irrigated" is the number on which irrigation is practiced, and for the purposes of this inquiry a "farm" is defined as for the general census of agriculture; that is, to be classed as a farm an establishment either must be 3 acres in extent or must have produced crops to the value of $250 in 1919, or must have required for its agricultural operations the continuous services of at least one person. "Number of farms irrigated" as used in this report and in that of 1910, is equivalent to the term "number of irrigators" used in census reports on irrigation previous to 1910.

Irrigation enterprise.—An "enterprise" is an independent irrigation establishment and includes the works for supplying water and the land to which water is supplied or is to be supplied, except that the cost or value of the land is not included in the "capital invested."

Acreage irrigated, in enterprises, and available for settlement.—Acreage irrigated is the acreage to which water was actually applied in the season preceding the census year—1919 for the Fourteenth Census and 1909 for the Thirteenth Census.

Acreage to which enterprises were capable of supplying water relates to the season following the time of taking the census and, consequently, is based on estimates made by those controlling the enterprises.

Acreage included in enterprises represents the extent of the plans of those controlling enterprises.

Acreage of irrigated land reported as available for settlement relates to land within existing enterprises and not to land that is susceptible of reclamation and settlement by new enterprises or extensions of existing enterprises.

Types of enterprises.—The types of enterprises under which all data are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands. In addition to serving land within its own projects, the United States Reclamation Service supplies stored water to land within other enterprises.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who may own no interest in the works.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization.

Capital invested.—The capital invested in irrigation enterprises is that reported by the owners. For the larger works the capital invested is taken, in most cases, from books of account and represents the actual investment. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the capital reported represents the owners' estimates. The schedules used in 1910 called for "cost," while the schedule used in the present census calls for "capital invested," but the instructions accompanying the schedules make these two terms equivalent. In both cases the investment includes cost of construction and of acquiring rights. The latter usually consists of filing fees only, but in some instances it includes the purchase price of rights. However, these cases are so rare that they are unimportant. The cost reported for 1900 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. For the Thirteenth and Fourteenth Censuses the average cost per acre is based on the acreage which enterprises were capable of irrigating in the census year and the cost to the date of the census—January 1, 1920, for the Fourteenth Census, and July 1, 1910, for the Thirteenth Census.

Operation and maintenance.—Cost of operation and maintenance was not reported on all schedules, and averages are based on the acreages for which cost is reported. No estimate of total cost of operation and maintenance for all irrigation enterprises has been made. In the case of enterprises operating pumping plants the cost of operation and maintenance includes cost of fuel and attendance.

Water rights.—The acreage irrigated has been classified by the character of rights under which water is received. The classes used are defined as follows:

"*Appropriation and use*" includes all rights acquired without formalities of any kind that have not been defined by the courts.

"*Notice filed and posted*" includes rights for which claims of some kind have been either posted or filed that have not been defined by the courts.

"*Adjudicated by court*" includes all rights that have been defined by the courts.

"*Permit from state*" includes all rights initiated under laws requiring any party wishing to acquire rights to obtain a permit from the state.

"*Certificate or license from the state*" includes rights acquired under laws providing for the issuing by the state of certificates or licenses defining rights acquired.

"*Riparian rights*" includes rights based on the ownership of riparian land.

"*Underground*" represents water taken from wells.

Source of water supply.—In classifying acreage by source of supply from which water for irrigation is obtained, in 1910 acreage was credited to what seemed to be the principal source of supply, while in the census of 1920 the attempt is made to represent the facts more nearly by presenting various mixed classes.

Date of beginning.—The date of beginning of irrigation enterprises is, in some cases, the date when construction began, and, in other cases, the date of filing a claim or of applying for a permit. If a filing or application for permit was made and work was begun and continued with reasonable diligence the date of filing is considered the date of beginning, otherwise the date of construction is taken as the date of beginning.

Drainage basin.—The drainage basin of a stream is all of the land drained by the stream and its tributaries.

Units of quantity and capacity.—Capacities of canals, reservoirs, wells, pumps, and engines, and quantities of water used are expressed in the units commonly used in engineering literature to express the same items. They are as follows:

Capacities of canals and volumes of flowing water are given in second-feet, a shorter equivalent for cubic feet per second.

Capacities of wells and pumps are given in gallons per minute. Four hundred and fifty gallons per minute equal 1 second-foot.

Capacities of reservoirs are given in acre-feet. An acre-foot is the quantity of water that will cover 1 acre to a depth of 1 foot. It equals 43,560 cubic feet.

Capacities of engines and motors are given in horsepower. One horsepower is the power required to lift 33,000 pounds through a vertical distance of 1 foot in 1 minute of time.

CLIMATIC CONDITIONS.

The surface of Wyoming consists of high, rolling prairies broken by mountain ranges. The main ranges of the Rocky Mountains pass through the state forming the Continental Divide, while many broken ranges occur, cutting the state into many more or less isolated valleys. The broken topography produces a variety in climatic conditions.

Except for small areas in the high mountains, no part of the state receives more than 20 inches of precipitation in normal years. Along the eastern border of the state the normal annual precipitation is from 15 to 20 inches and crops are grown without irrigation. Immediately west of this, and occupying nearly one-half the area of the state, is a wide zone in which the normal precipitation is from 10 to 15 inches. In this section there is little agriculture except in the stream valleys where irrigation is practiced. The grazing of cattle and sheep on the natural grasses forms the principal industry.

In the southwest part of the state is a large section—the Red Desert—where the precipitation is less than 10 inches and the same condition prevails in the Big Horn Basin in the northern part of the state.

In the valleys of the extreme western part of the state the normal annual precipitation varies from about 10 inches in the Green River Valley to about 18 inches in Jackson's Hole, near Yellowstone Park.

The year 1919 was the driest on record, except 1902. During the first eight months of the year, which includes the growing season for crops, the precipitation was only about one-half the normal. In many places dry-farm crops were a total failure, and in many sections irrigated crops suffered because of shortage of water.

WATER SUPPLY FOR IRRIGATION.

Since Wyoming lies along the Continental Divide, the rivers rising in its mountains flow into adjoining states on all four sides. Crossing the eastern border to South Dakota and Nebraska are Belle Fourche, Cheyenne, and North Platte Rivers, and Lodgepole Creek. Flowing to the south are only small streams except Green River; while from the south the state receives the North Platte and the Laramie. Bear River and Snake River flow to the west into Idaho; and to the north into Montana flow Yellowstone, Clark Fork of the Yellowstone, Big Horn, Tongue, Powder, and Little Missouri Rivers and many smaller streams.

The streams flowing to the east, except the North Platte, do not carry large volumes of water except in flood periods, and they flow through a country where crops can be grown with some success without irrigation. Storage is necessary if these streams are to be used extensively for irrigation.

The North Platte rises in north central Colorado, flows in a northerly direction about half way across Wyoming, turns abruptly to the east, and flows in a southeasterly direction to the Wyoming-Nebraska line. Throughout most of its course in Wyoming the North Platte flows through a rough mountainous country where there is little opportunity to use its water for irrigation. Its principal tributaries in Wyoming are the Medicine Bow, coming from the east; the Sweetwater, coming from the west, and the Laramie, coming from the south. Just below the mouth of the Sweetwater the United States Reclamation Service has built the Pathfinder Reservoir, having a capacity of about 1,000,000 acre-feet, which is about two-thirds of the average total annual discharge of the river at that point. Since a large part of the annual discharge is used as it comes, this reservoir has sufficient capacity to control the flow of the stream except in years of abnormal flood discharge. Water is diverted from both sides of the North Platte about 30 miles west of the Wyoming-Nebraska line, for use on lands in both states. The canal on the south side is under construction, and much additional land will be irrigated from the North Platte in that section. Stored water from Pathfinder Reservoir is supplied to a large area under private canals, mainly in Nebraska.

Laramie River, a tributary of the North Platte, like the main stream, rises in the mountains of northern Colorado and flows into Wyoming. Some of its waters are diverted from its drainage basin into the tributaries of the South Platte in Colorado, and there are large projects on the stream in Wyoming. Litigation between the parties taking water from the stream in Colorado and in Wyoming is pending in the United States Supreme Court.

Very little land is irrigated from the streams along the southern border of the state. The country is largely rough and undeveloped, and far from transportation. Green River rises in high mountains that receive a very heavy snowfall, and carries a large volume of unused water, but the valleys through which it flows are undeveloped and lack transportation facilities. Green River is one of the principal tributaries of Colorado River, and possible storage and use of its water is being studied in connection with the whole Colorado River System.

Bear River, which rises in Utah, flows into Wyoming and crosses and recrosses into Utah and Idaho, and finally discharges into Great Salt Lake, flows principally through high mountain valleys in Wyoming. It is not susceptible of much larger use in Wyoming.

Snake River rises in the southern part of Yellowstone National Park, and some of its headwater tributaries rise in very close proximity to those of Green River. There is not much opportunity to use this river in Wyoming as its course is through high mountain valleys. Jackson Lake lies along the course of Snake River, and is used as a reservoir to store flood water for use along the course of the river in Idaho.

Yellowstone River rises in the mountains to the southeast of Yellowstone National Park, flows into Yellowstone Lake within the park, and thence into Montana. There is practically no opportunity to use this stream for irrigation in Wyoming.

Big Horn River and its tributaries drain the whole north central part of Wyoming. Their headwaters rise in the mountains southeast of Yellowstone National Park, near those of Green, Snake, and Yellowstone Rivers. The larger of the tributaries are Wind, Greybull, and Shoshone Rivers. All of these streams are used for irrigation, but only on the Shoshone has provision been made for storing the flood waters on a large scale. On that stream the United States Reclamation Service has built the Shoshone Reservoir, which has a capacity of 456,600 acre-feet. This is less than one-half of the average annual run-off of the river at this point, and there is opportunity for additional storage.

The other streams flowing north into Montana flow through the high plains, where there is little irrigation and where some crops can be grown in most years without irrigation.

The supply of water in streams has met the demands for irrigation so far and there has been little attempt to develop ground water.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	6,449	2.4	41.0	1,207,982	6.6	1.9	10.2	57.5
1910	6,297	69.2	57.3	1,133,302	87.1	1.8	13.3	90.2
1900	3,721	94.1	61.1	605,878	163.8	1.0	7.5	76.5
1890	1,917	.....	61.3	229,676	.....	0.4	12.5	48.2

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of acreage in enterprises.	
Total	3,564	2,564,668	1,207,982	47.1	1,831,039
Before 1860	2	640	320	50.0	320
1860-1869	14	10,005	9,288	92.8	9,880
1870-1879	152	141,117	77,228	54.7	104,503
1880-1889	931	702,056	406,196	57.9	518,857
1890-1899	613	395,655	239,300	60.5	337,220
1900-1904	566	330,746	163,543	49.4	298,831
1905-1909	442	519,421	169,976	32.7	327,299
1910-1914	366	140,116	55,288	39.5	97,482
1915-1919	252	216,585	18,642	8.6	53,827
Not reported	226	108,327	68,201	63.0	83,020

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	1,207,982	1,133,302	74,680	6.6	1,831,039	2,564,668
Stream, gravity	1,155,596	1,112,234	43,362	3.9	1,707,209	2,417,882
Stream, pumped	1,525	1,540	−15	−1.0	3,448	4,700
Wells, pumped	147	75	72	.....	148	148
Wells, flowing	19	64	−45	.....	40	65
Lake, gravity	355	120	235	195.8	381	545
Springs	5,985	5,008	977	19.5	10,268	12,527
Stored storm water	10,852	14,261	−3,409	−23.9	46,728	51,822
Stream, gravity, and pumped wells	400	(2)	400	.....	634	854
Other mixed	33,043	(2)	33,043	.....	62,063	76,065
Other and not reported	60	(2)	60	.....	60	60

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100.
[2] Not included in classification in 1910.

ACREAGE, BY CHARACTER OF ENTERPRISE.

Wyoming accepted the conditions of the Federal Carey Act (act of Congress, Aug. 18, 1894), in 1895. The original act granted to each of the states containing arid land 1,000,000 acres, and an amendment granted to Wyoming an additional area of 1,000,000 acres.

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Acres.	Per cent.
ACREAGE IRRIGATED.				
Total	1,207,982	1,133,302	74,680	6.6
Individual and partnership	724,620	813,823	−89,203	−11.0
Cooperative	286,702	116,317	170,385	146.5
Irrigation district	22,935	11,800	11,135	94.4
Carey Act	36,230	86,252	−50,022	−58.0
Commercial	57,800	87,935	−30,135	−34.3
U. S. Reclamation Service	53,555	12,905	40,650	315.0
U. S. Indian Service	22,000	4,270	17,730	415.2
State	2,120	(2)	2,120	.....
City	2,020	(2)	2,020	.....
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	1,831,039	1,639,510	191,529	11.7
Individual and partnership	1,008,379	1,024,137	−15,758	−1.5
Cooperative	432,956	165,476	267,480	161.6
Irrigation district	54,017	27,050	26,967	99.7
Carey Act	72,215	205,974	−133,759	−64.9
Commercial	121,310	133,305	−11,995	−9.0
U. S. Reclamation Service	93,022	34,869	58,153	166.8
U. S. Indian Service	45,000	48,699	−3,699	−7.6
State	2,120	(2)	2,120	.....
City	2,020	(2)	2,020	.....
ACREAGE INCLUDED IN ENTERPRISES.				
Total	2,564,668	2,224,298	340,370	15.3
Individual and partnership	1,339,116	1,153,378	185,738	16.1
Cooperative	532,206	189,894	342,312	180.3
Irrigation district	56,617	27,050	29,567	109.3
Carey Act	98,190	426,472	−328,282	−77.0
Commercial	146,478	195,967	−49,489	−25.3
U. S. Reclamation Service	299,789	167,880	131,909	78.6
U. S. Indian Service	87,940	63,657	24,283	38.1
State	2,155	(2)	2,155	.....
City	2,177	(2)	2,177	.....

[1] A minus sign (−) denotes decrease.
[2] Not included in classification in 1910.

An irrigation district law was enacted in 1907. This law has been utilized both for the financing of new enterprises and for buying in enterprises originally organized in some other form.

The areas reported under United States Reclamation Service in Table 5 include land watered by a Carey Act enterprise supplied under contract.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

The laws of Wyoming relating to water rights are summarized in the following paragraphs:

Wyoming was organized as a territory in 1868 and the first territorial legislature adopted the common law of England so far as it was "not inapplicable." The supreme court of the state has held that this enactment did not establish in Wyoming the common law of riparian rights, since it is "unsuited to our requirements and necessities" (Moyer *v.* Preston, 6 Wyo. 308).

In 1875 the territory enacted a law providing that persons holding land along any stream were entitled to use the water for irrigation and to the right of way for canals over the land of others.

In 1886 there was enacted a law to regulate the use of water for irrigation and other purposes. It divided the territory into districts, gave the district courts jurisdiction over water rights, required all parties claiming rights to water to file statements of their claims with the clerks of the proper courts, required all parties wishing to acquire rights to file statements before beginning construction of works, and provided that whenever any party interested in any ditch, canal, or reservoir desired a determination of the priority of rights to water from the source from which water was obtained, he might apply to the proper district court for an adjudication.

The law of 1886 declared "The water of every natural stream not heretofore appropriated within this territory is hereby declared to be the property of the public, and the same is dedicated to the use of the people, subject to appropriation as herein provided."

Wyoming was admitted to the Union as a state in 1890, and the constitution of the state contained the following general declarations regarding water:

"The water of all natural streams, springs, lakes, or other collections of still water within the boundaries of the state are hereby declared to be the property of the state." (Art. 8, sec. 1.)

"Priority of appropriation for beneficial uses shall give the better right. No appropriation shall be denied except when such denial is demanded by the public interests." (Art. 8, sec. 3.)

The constitution provided also for the office of state engineer, and a board of control of which the engineer is president, to which was assigned "supervision of the waters of the state and of their appropriation, distribution, and diversion."

The first state legislature enacted the laws necessary to the carrying out of the constitutional provisions referred to, and the system adopted at that time is still in effect.

Persons wishing to acquire rights are required to make application to the state engineer for permits and are to submit proof of the completion of irrigation works in accordance with the permits, and the board of control is to issue certificates defining the rights acquired.

Rights previously acquired are adjudicated by the board of control, and certificates defining rights in accordance with the decisions of the board are issued.

Many suits attacking the law of 1890 have been decided by the state supreme court, and the law has been upheld by the court.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909, per cent of total.
	Acres.	Per cent of total.	
Total	1,207,982	100.0	100.0
Appropriation and use	25,662	2.1	8.7
Notice filed and posted	60,792	5.0	0.8
Adjudicated by court	162,186	13.4	4.3
Permit from state	466,026	38.6	28.3
Certificate or license from state	457,038	37.8	57.9
Underground	276	(1)	.....
Other and mixed	657	0.1	.....
Not reported	35,345	2.9	.....

[1] Less than one-tenth of 1 per cent.

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributaries were included in those reported for the main streams.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Total	1,207,982	773,111	56.2	2,564,668	1,831,039
Missouri River drainage	869,845	580,631	49.8	1,895,348	1,308,438
Clark Fork (of Yellowstone) and tributaries	8,897	4,567	94.8	15,640	14,121
Clark Fork direct	3,686	2,860	28.9	5,369	5,312
Tributaries of Clark Fork	5,211	[2] 1,707	205.3	10,271	8,809
Big Horn River and tributaries	307,846	113,875	170.3	750,261	468,198
Big Horn River direct	42,799	2,502	.....	70,295	56,945
Popo Agie River	22,073	14,340	53.9	34,723	34,375
Wind River	43,620	3,787	.....	228,338	77,122
Poison Creek	5	2,690	−99.8	10	10
Owl Creek	11,610	6,558	77.0	14,546	12,951
No Wood River	18,416	10,099	82.4	26,193	22,080
Greybull River	49,231	35,552	38.5	93,543	79,134
Shell Creek	11,955	4,319	176.8	24,005	22,406
Shoshone River	95,091	26,311	261.4	217,998	134,431
Little Horn River	1,408	4,761	−70.4	11,353	4,340
Other tributaries of Big Horn River	11,638	[2] 2,956	293.7	29,257	24,404
Tongue River and tributaries	43,025	35,623	20.8	69,167	59,290
Tongue River direct	9,805	7,285	34.6	11,679	10,771
Goose Creek	27,627	20,653	33.8	43,817	37,749
Other tributaries of Tongue River	5,593	[2] 7,685	−27.2	13,671	10,770
Powder River and tributaries	88,903	64,357	38.1	132,985	112,340
Powder River direct	2,465	.....	.....	4,975	4,962
Red Fork Creek	3,341	2,610	28.0	4,271	3,385
Crazy Woman Creek	21,965	6,950	216.0	29,684	24,151
Clear Creek	50,648	47,801	6.0	71,560	63,735
Other tributaries of Powder River	10,484	[2] 6,996	49.9	22,495	16,107
Little Missouri River	60	[2] 165	−63.6	60	60
Tributaries of Cheyenne River	7,872	14,291	−44.9	16,818	11,531
North Fork (Belle Fourche)	1,966	6,173	−68.2	5,054	3,621
South Fork	5,906	7,906	−25.3	11,764	7,910
Other tributaries of Cheyenne River	.....	212	−100.0	.....	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902—Continued.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES). 1919	1902	Per cent of increase.[1]	Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
Missouri River drainage—Con.					
Niobrara River	445	[2] 975	−54.4	445	445
North Platte River and tributaries	402,993	336,840	19.6	888,419	628,233
North Platte River direct	56,794	39,570	43.5	120,195	76,966
Beaver Creek	2,621	7,370	−64.4	3,666	3,186
Grand Encampment Creek	7,053	6,622	6.5	10,173	7,293
Spring Creek	13,123	7,679	70.9	18,702	18,177
Sage Creek	375	1,634	−77.1	570	570
Pass Creek	8,557	8,390	2.0	12,500	11,373
Medicine Bow River	54,500	40,661	34.0	139,599	67,103
Sweetwater River	5,448	11,403	−52.2	14,166	10,593
Muddy Creek	657	1,525	−56.9	1,112	677
Box Elder Creek	4,648	4,740	−1.9	7,916	7,696
La Prele Creek	9,103	4,524	101.2	21,697	15,690
Labonte Creek	4,376	3,639	20.3	6,525	5,756
Laramie River and tributaries	149,999	138,176	8.6	366,928	291,993
Laramie River direct	72,400	57,335	26.3	171,554	122,956
Little Laramie River	30,860	53,105	−41.9	42,852	33,144
Sybille Creek	6,183	7,234	−14.5	9,519	8,044
North Laramie River	6,858	5,721	19.9	20,144	11,749
Chugwater Creek	5,914	3,907	51.4	9,853	9,268
Other tributaries of Laramie River	27,784	[2] 10,874	155.5	113,006	106,842
Rawhide Creek	2,045	4,187	−51.2	3,651	2,481
Horse Creek	28,369	15,524	82.7	71,188	39,702
Other tributaries of North Platte River	[2] 55,325	[2] 41,196	34.3	89,831	68,977
Tributaries of South Platte River	9,804	9,888	−0.8	21,553	14,220
Lodgepole Creek	1,775	3,694	−51.9	10,184	3,694
Crow Creek	2,580	3,643	−29.2	5,590	4,867
Lone Tree Creek	1,960	1,444	35.7	2,040	1,905
Cache la Poudre River	3,489	1,077	224.0	3,739	3,694
Other tributaries of South Platte River	.....	[2] 30	−100.0	.....	.....
Other tributaries of Missouri River	.....	[2] 50	−100.0	.....	.....
Colorado River drainage	211,507	118,566	78.4	473,116	353,731
Green River and tributaries	211,507	118,566	78.4	473,116	353,731
Green River direct	20,285	11,351	78.7	32,492	28,034
New Fork	27,743	10,975	152.8	53,918	43,614
Horse Creek	15,520	6,569	136.3	21,670	19,453
Cottonwood Creek	17,437	4,673	272.7	32,317	29,283
South Piney Creek	11,928	16,179	−26.3	30,924	26,307
La Barge Creek	5,459	5,055	8.0	11,700	7,725
Fontenelle Creek	4,428	3,241	36.6	5,858	5,033
Bitter Creek	2,395	1,405	70.5	12,495	11,447
Blacks Creek	65,980	28,139	134.5	175,970	104,305
Henrys Fork	8,298	6,813	21.8	25,940	23,094
Little Snake River	13,463	17,363	−22.5	18,038	16,358
Other tributaries of Green River	18,571	[2] 6,803	173.0	51,794	38,388
Great Salt Lake drainage	63,665	32,764	94.3	91,842	82,470
Bear River and tributaries	63,665	32,764	94.3	91,842	82,470
Bear River direct	37,306	25,160	48.3	49,027	45,412
Tributaries of Bear River	26,359	[2] 7,604	246.6	42,815	37,058
Columbia River drainage	62,965	41,150	53.0	104,362	86,400
Snake River and tributaries	62,965	41,150	53.0	104,362	86,400
Snake River direct	912	1,050	−13.1	2,202	1,879
Gros Ventre River	6,718	3,523	90.7	9,866	7,493
Little Gros Ventre River	6,243	3,599	73.5	9,157	6,997
Salt River	34,338	22,570	52.1	57,288	46,234
Tributaries of Pierre River	.....	5,372	−100.0	.....	.....
Other tributaries of Snake River	14,754	[2] 5,036	193.0	25,849	23,797

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE. Amount.	Per cent of increase.
1920	$34,326,328	93.9	$19.06	76.5
1910	17,700,980	345.5	10.80	64.6
1900	3,973,165	377.9	6.56	81.2
1890	831,427	.....	3.62	.....

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$34,326,328	100.0	$18.75
Before 1860	1,250	(1)	3.91
1860–1869	45,731	0.1	4.63
1870–1879	978,368	2.9	9.36
1880–1889	5,459,654	15.9	10.52
1890–1899	3,109,641	9.1	9.22
1900–1904	4,844,972	14.1	16.21
1905–1909	14,962,407	43.6	45.71
1910–1914	1,621,916	4.7	16.64
1915–1919	2,337,484	6.8	43.59
Not reported	964,905	2.8	11.62

[1] Less than one-tenth of 1 per cent.

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920. Amount.	Per cent of total.	Average per acre.	OPERATION AND MAINTENANCE, 1919. Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$34,326,328	100.0	$18.75	809,581	$1.04
Stream, gravity	33,025,460	96.2	19.34	826,086	1.03
Stream, pumped	99,914	0.3	28.98	985	9.91
Wells, pumped	10,460	(2)	70.68	122	7.79
Wells, flowing	4,630	(2)	115.75	12	9.58
Lake, gravity	4,935	(2)	12.95	60	0.83
Springs	66,209	0.2	6.46	2,983	0.60
Stored storm water	407,055	1.2	8.71	10,055	0.73
Stream, gravity, and pumped wells	16,770	(2)	26.45	125	1.20
Other mixed	690,705	2.0	11.13	20,153	1.25
Other and not reported	100	(2)	1.67	.....	.....

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.[1] Amount.	Per cent.
Total	$34,326,328	$4,701,049	$29,625,279	630.2
Missouri River drainage	29,818,236	3,901,748	25,916,488	664.2
Clark Fork (of Yellowstone) and tributaries	117,292	40,475	76,817	189.8
Clark Fork direct	55,402	26,150	29,252	111.9
Tributaries of Clark Fork	61,890	[2] 14,325	47,565	332.0
Big Horn River and tributaries	14,330,800	919,433	13,411,367	.....
Big Horn River direct	1,295,576	22,000	1,273,576	.....
Popo Agie River	349,546	72,264	277,282	383.7
Wind River	2,101,819	17,904	2,083,915	.....
Poison Creek	1,000	18,700	−17,700	−94.7
Owl Creek	52,915	40,154	12,761	31.8
No Wood River	161,588	81,978	79,610	97.1
Greybull River	503,184	204,604	298,580	145.9
Shell Creek	380,420	32,730	347,690	.....
Shoshone River	8,702,480	378,278	8,324,202	.....
Little Horn River	35,000	31,695	3,305	10.4
Other tributaries of Big Horn River	747,272	[2] 19,126	728,146	.....
Tongue River and tributaries	811,125	218,405	592,720	271.4
Tongue River direct	125,555	50,750	74,805	147.4
Goose Creek	563,518	127,100	436,418	343.4
Other tributaries of Tongue River	122,052	[2] 40,555	81,497	201.0
Powder River and tributaries	1,159,996	285,084	874,912	306.9
Powder River direct	162,100	.....	162,100	.....
Red Fork Creek	78,500	12,800	65,700	513.3
Crazy Woman Creek	127,791	22,275	105,516	473.7
Clear Creek	553,465	189,375	364,090	192.3
Other tributaries of Powder River	248,140	[2] 60,634	187,506	309.2
Little Missouri River	726	[2] 950	−224	−23.6
Tributaries of Cheyenne River	242,886	102,877	140,009	136.1
North Fork (Belle Fourche)	76,066	50,165	25,901	51.6
South Fork	166,820	49,272	117,548	238.6
Other tributaries of Cheyenne River	.....	[2] 3,440	−3,440	−100.0
Niobrara River	10,565	[2] 4,200	6,365	151.5

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902—Continued.

DRAINAGE BASIN.	1920	1902	INCREASE.[1] Amount.	INCREASE.[1] Per cent.
Missouri River drainage—Con.				
North Platte River and tributaries	12,931,901	2,227,217	10,704,684	480.6
North Platte River direct	5,920,923	306,084	5,614,839	.....
Beaver Creek	37,497	51,168	—13,671	—26.7
Grand Encampment Creek	72,692	50,828	21,864	43.0
Spring Creek	184,290	38,496	145,794	378.7
Sage Creek	4,206	13,790	—9,584	—69.5
Pass Creek	50,051	41,877	8,174	19.5
Medicine Bow River	346,664	244,287	102,377	41.9
Sweetwater River	87,322	54,701	32,621	59.6
Muddy Creek	7,770	6,546	1,224	18.7
Box Elder Creek	104,676	37,655	67,021	178.0
La Prele Creek	327,411	37,500	289,911	773.1
Labonte Creek	71,826	32,640	39,186	120.1
Laramie River and tributaries	4,334,896	888,096	3,446,800	388.1
Laramie River direct	923,041	661,206	261,835	39.6
Little Laramie River	48,753	119,122	—70,369	—59.1
Sybille Creek	65,041	32,200	32,841	102.0
North Laramie River	396,708	13,856	382,822	.....
Chugwater Creek	83,155	30,945	52,210	168.7
Other tributaries of Laramie River	2,818,198	[2] 30,737	2,787,461	.....
Rawhide Creek	27,330	49,445	—22,115	—44.7
Horse Creek	536,475	132,847	403,628	303.8
Other tributaries of North Platte River	817,872	[2] 241,257	576,615	239.0
Tributaries of South Platte River	212,945	102,907	110,038	106.9
Lodgepole Creek	89,037	39,500	49,537	125.4
Crow Creek	48,919	43,925	4,994	11.4
Lone Tree Creek	36,173	17,380	18,793	108.1
Cache la Poudre River	38,816	1,997	36,819	.....
Other tributaries of South Platte River	.....	[2] 105	—105	—100.0
Other tributaries of Missouri River	.....	[2] 200	—200	—100.0
Colorado River drainage	3,064,797	579,190	2,485,607	429.2
Green River and tributaries	3,064,797	579,190	2,485,607	429.2
Green River direct	170,841	31,750	139,091	438.1
New Fork	293,043	27,253	265,790	975.3
Horse Creek	51,163	13,350	37,813	283.2
Cottonwood Creek	456,827	11,000	445,827	.....
South Piney Creek	85,728	38,761	46,967	121.2
La Barge Creek	39,150	20,365	18,785	92.2
Fontenelle Creek	33,000	9,777	23,223	237.5
Bitter Creek	93,158	4,500	88,658	.....
Blacks Creek	566,776	68,296	498,480	729.9
Henrys Fork	77,320	11,291	66,029	584.8
Little Snake River	274,302	325,107	—50,805	—15.6
Other tributaries of Green River	923,489	[2] 17,740	905,749	.....
Great Salt Lake drainage	679,405	118,340	561,065	474.1
Bear River and tributaries	679,405	118,340	561,065	474.1
Bear River direct	204,588	87,355	207,233	237.2
Tributaries of Bear River	384,817	[2] 30,985	353,832	.....
Columbia River drainage	763,890	101,771	662,119	650.6
Snake River and tributaries	763,890	101,771	662,119	650.6
Snake River direct	500,202	8,570	491,632	.....
Gros Ventre River	31,225	14,802	16,423	111.0
Little Gros Ventre River	18,746	13,330	5,416	40.6
Salt River	149,207	41,724	107,483	257.6
Tributaries of Pierre River	.....	12,595	—12,595	—100.0
Other tributaries of Snake River	64,510	[2] 10,750	53,760	500.1

[1] A minus sign (—) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.

In classifying capital invested by type of enterprise (Table 12) the average capital invested per acre is not presented, for the reason that it is not possible to compute this correctly. The United States Reclamation Service supplies stored water from reservoirs in Wyoming to enterprises controlled by agencies of most of the other classes shown in the table, in Nebraska and Idaho, as well as in Wyoming, and a part of its expenditure is properly chargeable to those lands; but it is not possible to tell how much should be so charged or how it should be distributed among the various classes.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920. Amount.	CAPITAL INVESTED, 1920. Per cent of total.	OPERATION AND MAINTENANCE, 1919. Area for which cost is reported (acres).	OPERATION AND MAINTENANCE, 1919. Average cost per acre.[1]
Total	$34,326,328	100.0	869,581	$1.04
Individual and partnership	8,738,886	25.5	439,726	1.04
Cooperative	6,701,990	19.5	244,642	0.95
Irrigation district	1,441,312	4.2	21,417	0.77
Carey Act	2,434,791	7.1	33,705	1.34
Commercial	730,502	2.3	56,300	0.55
U. S. Reclamation Service	12,863,870	37.5	50,631	1.87
U. S. Indian Service	1,330,887	3.9	22,000	1.19
State	15,050	([2])	1,140	0.61
City	9,980	([2])	20	142.50

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE: 1920.

Number of enterprises reporting land drained or needing drainage	144
Acreage included in enterprises reporting land drained or needing drainage	513,347
Acreage for which drains have been installed	68,086
Additional acreage needing drainage	75,183
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	13.3
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	2.7
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	5.6

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. While the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume of water entering canals, second-feet	9,890	3,706	6,184
Area irrigated in 1919.....acres	454,615	228,539	226,076
Average number of acres per second-foot	46	62	37
Total quantity of water entering canals..acre-feet	1,310,560	491,047	819,513
Area irrigated in 1919.....acres	545,265	230,729	314,536
Average quantity per acre.....acre-feet	2.4	2.1	2.6
Total quantity of water delivered.....acre-feet	393,985	274,200	119,785
Area irrigated in 1919.....acres	186,328	128,021	58,307
Average quantity per acre.....acre-feet	2.1	2.1	2.1

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	2,066	301	5,007	39,009	9,517	2,777	2,534	374	2,911,748
Before 1860	1		2	2	2				
1860–1869	16		24	135	55	1	10		
1870–1879	96	10	327	1,617	538	24	24	16	11,952
1880–1889	679	46	1,557	9,540	2,720	815	682	55	156,152
1890–1899	383	32	910	7,189	1,753	695	537	31	7,507
1900–1904	311	46	718	6,111	1,474	224	176	62	983,034
1905–1909	219	62	526	8,422	1,290	673	856	102	1,718,235
1910–1914	163	49	408	2,947	791	152	99	61	26,052
1915–1919	103	41	290	2,131	525	123	82	34	8,075
Not reported	95	15	245	915	369	70	68	13	741

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	17.9	7	46	16	8,020	57	1,304	70	39,725
Before 1860									
1860–1869									
1870–1879	1.0	2		1		1	8	1	
1880–1889	1.1	1		4	3,000	5	185	5	8,200
1890–1899	3.6					2	40	2	3,470
1900–1904	2.9			3	2,500	8	324	9	3,720
1905–1909	4.2					4	81	4	6,050
1910–1914	0.8			2	1,435	17	483	17	11,652
1915–1919	0.2	2	40	3	185	11	91	14	4,776
Not reported	4.1	2	6	3	900	9	92	18	1,857

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	2,066	301	5,007	39,009	9,517	2,777	2,534	374	2,911,748
Individual and partnership	1,942	267	4,782	24,387	7,808	2,050	1,073	333	70,733
Cooperative	95	17	180	8,702	1,181	287	534	13	86,803
Irrigation district	2	1	7	708	100	20	70	2	43,947
Carey Act	7	6	14	1,298	133	40	149	10	67,466
Commercial	11	3	13	1,543	187	68	221	8	266,002
U. S. Reclamation Service	2	5	4	2,345	93	281	473	6	2,376,385
U. S. Indian Service									
State	7	1	6	20	7	31	14	1	411
City		1	1	6	8			1	1

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	17.9	7	46	16	8,020	57	1,304	70	39,725
Individual and partnership	11.7	7	46	16	8,020	55	1,239	57	39,725
Cooperative	2.6					1	15	11	
Irrigation district	0.5								
Carey Act									
Commercial	0.1								
U. S. Reclamation Service	1.9								
U. S. Indian Service									
State	0.8					1	50	2	
City	0.3								

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	2,066	301	5,007	39,009	9,517	2,777	2,534	374	2,911,748
Missouri River drainage	1,546	252	3,429	27,977	6,671	1,750	1,932	321	2,039,572
Clark Fork (of Yellowstone) and tributaries	4		58	214	90	6	7	4	2,704
Clark Fork direct			4	38	12	2	6		
Tributaries of Clark Fork	4		54	176	78	4	1	4	2,704
Big Horn River and tributaries	266	30	732	8,202	2,029	494	696	70	466,867
Big Horn River direct	10	1	27	712	143	36	47	1	2
Popo Agie River	37		122	605	270	20	34	1	112
Wind River	7	1	88	1,005	233	12	13	2	2,050
Poison Creek			1					1	3
Owl Creek	6		12	279	89	12	16	6	275
No Wood River	21	5	94	388	206	8	5	4	60
Graybull River	46	1	100	1,276	327	20	71	4	181
Shell Creek	31	5	53	433	145	10	20	5	1,037
Shoshone River	38	9	64	3,079	327	294	448	17	460,806
Little Horn River	2		7	46	42	15	1	1	25
Other tributaries of Big Horn River	68	8	164	379	247	67	41	28	1,716
Tongue River and tributaries	160	25	201	1,534	452	113	98	27	11,227
Tongue River direct	20		23	359	101	48	7		
Goose Creek	91	21	99	874	229	30	58	16	10,579
Other tributaries of Tongue River	49	4	79	301	122	35	33	11	648
Powder River and tributaries	135	19	224	2,509	656	73	122	15	4,062
Powder River direct	1		1	72	17	1	3		
Red Fork Creek	19		25	60	50	1	1		
Crazy Woman Creek	17	2	49	525	113	18	10	4	37
Clear Creek	46	9	83	1,468	312	40	94	3	3,389
Other tributaries of Powder River	52	8	66	384	164	13	14	8	636
Little Missouri River		1	1		1				
Tributaries of Cheyenne River	71	40	118	1,203	166	245	98	39	6,479
North Fork (Belle Fourche)	24	25	49	397	75	108	19	26	2,433
South Fork	47	15	69	806	91	137	79	13	4,046
Niobrara River	3	2	7	8	4				
North Platte River and tributaries	865	113	1,933	13,878	3,082	783	898	141	1,544,370
North Platte River direct	24	4	78	3,134	260	197	197	2	1,070,005
Beaver Creek	12	2	20	50	62	1	1	3	673
Grand Encampment Creek	13	1	31	106	52	7	7	1	150
Spring Creek	3	2	48	343	79	63	45	3	3,596
Sage Creek	2		4	3	4				
Pass Creek	3		54	293	84	18	9	1	2,000
Medicine Bow River	112	13	283	927	414	68	58	9	7,459
Sweetwater River	42	1	85	174	141	37	20	9	2,474
Muddy Creek	1		5	12	7				
Box Elder Creek	13	3	33	44	68	5	16	3	36
La Prele Creek	11	3	47	326	81	13	62	2	20,012
Laboute Creek	40		42	54	76	24	24		
Laramie River and tributaries	358	40	624	5,933	909	150	334	48	396,031
Laramie River direct	40	7	69	1,718	287	93	228	7	263,350
Little Laramie River	42		98	435	141	26	15		
Sybille Creek	98	11	122	297	119	4	3	10	260
North Laramie River	101	6	128	462	86	9	15	6	8,019
Chugwater Creek	37	10	100	152	107	10		8	394
Other tributaries of Laramie River	40	6	107	2,869	169	8	73	17	124,008
Rawhide Creek	13	2	13	42	13	33	9	2	46
Horse Creek	46	26	121	774	169	32	41	26	27,335
Other tributaries of North Platte River	172	16	445	1,663	663	135	75	32	14,553
Tributaries of South Platte River	42	22	155	429	191	36	13	25	3,863
Lodgepole Creek	9	11	33	256	47	28	13	7	2,633
Crow Creek	8	4	53	115	47	8		7	473
Lone Tree Creek	16	4	34	55	12			6	710
Cache la Poudre River	9	3	35	3	85			5	47
Colorado River drainage	361	40	1,019	7,495	1,908	823	503	40	24,772
Green River and tributaries	361	40	1,019	7,495	1,908	823	503	40	24,772
Green River direct	23	1	56	1,403	171	14	9	2	114
New Fork	9	2	78	1,011	241	133	86	1	
Horse Creek	6		41	403	82				
Cottonwood Creek	19		83	485	131	125	75		
South Piney Creek	26	1	110	221	163	333	116		
La Barge Creek	22		19	131	44	6	2		
Fontenelle Creek	20		24	73	35	8	6		
Bitter Creek	3	1	21	25	28	1	4	16	1,105
Blacks Creek	156	9	325	1,867	532	54	114	11	3,333
Henrys Fork	45	22	110	301	143	74	42	3	23
Little Snake River	8		58	289	127	4	1	2	458
Other tributaries of Green River	24	4	94	1,286	211	71	48	5	19,739
Great Salt Lake drainage	54	7	219	1,306	380	59	40	11	324
Bear River and tributaries	54	7	219	1,306	380	59	40	11	324
Bear River direct	11		86	703	170	13	7		
Tributaries of Bear River	43	7	133	603	210	46	33	11	324
Columbia River drainage	105	2	340	2,231	558	145	59	2	847,080
Snake River and tributaries	105	2	340	2,231	558	145	59	2	847,080
Snake River direct	1		9	42	12	10		1	847,000
Gros Ventre River	20		29	118	64	1	1		
Little Gros Ventre River	14		32	103	50				
Salt River	50	2	169	1,355	297	116	54	1	80
Other tributaries of Snake River	20		101	613	135	18	4		

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN, 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total	17.9	7	46	16	8,020	57	1,304	70	39,725	31
Missouri River drainage	13.7	5	46	16	8,020	54	1,260	65	38,220	31
Big Horn River and tributaries	9.9	1		1	950	18	368	22	9,950	40
Big Horn River direct	4.4			1	950	14	319	17	6,990	43
Popo Agie River	2.0					1	3	1	175	12
Owl Creek	0.1									
No Wood River	0.2					1	26	1	1,200	58
Shell Creek	0.2									
Shoshone River	2.5									
Little Horn River	0.5									
Other tributaries of Big Horn River		1				2	20	3	1,585	10
Tongue River and tributaries	0.2			2		2	75	2	4,700	30
Tongue River direct						1	50	1	3,000	38
Goose Creek						1	25	1	1,700	22
Other tributaries of Tongue River	0.2			2						
Powder River and tributaries	0.3	2	6	1	5	6	349	6	1,305	51
Powder River direct						2	24	2	900	26
Clear Creek	0.3					2	298	2	200	54
Other tributaries of Powder River		2	6	1	5	2	27	2	205	70
Tributaries of Cheyenne River	0.2			1	2,000	5	119	5	4,491	18
North Fork (Belle Fourche)				1	2,000	4	103	4	3,391	20
South Fork	0.2					1	16	1	1,100	10
North Platte River and tributaries	3.1	2	40	9	4,330	21	329	28	17,039	22
North Platte River direct	0.2			2	3,180	11	240	11	14,602	25
Grand Encampment Creek	0.1									
Spring Creek		1		2		1		1		
Medicine Bow River	1.0			3		5	33	12	787	18
Muddy Creek	0.5									
Box Elder Creek		1	40							
Laramie River and tributaries	0.4			2	1,150	3	6	3	1,650	13
Laramie River direct	0.3					1		1	500	10
North Laramie River				1	700	1		1	700	16
Chugwater Creek				1	450	1	6	1	450	
Other tributaries of Laramie River	0.1									
Horse Creek	0.1									
Other tributaries of North Platte River	0.8					1	50	1		20
Tributaries of South Platte River				2	735	2	20	2	735	12
Lodgepole Creek				2	735	2	20	2	735	12
Colorado River drainage	0.2	2				3	44	5	1,505	34
Green River and tributaries	0.2	2				3	44	5	1,505	34
Green River direct	0.1					2	22	4	1,505	39
Bitter Creek		2								
Little Snake River	0.1									
Other tributaries of Green River						1	22	1		24
Great Salt Lake drainage	4.0									
Bear River and tributaries	4.0									
Bear River direct	2.0									
Other tributaries of Bear River	2.0									

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATE: 1919 AND 1909.

[Totals for the state, used in making comparisons, are shown in state bulletin on agriculture.]

	CROP.	AREA HARVESTED.					QUANTITY HARVESTED.					
		1919		1909		Per cent of increase.[1]	Unit.	1919		1909		Per cent of increase.[1]
		Acres.	Per cent of total for state.	Acres.	Per cent of total for state.			Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Corn	2,738	7.1	1,176	12.7	132.8	Bu.	51,839	13.3	25,297	14.3	104.9
2	Oats	23,684	40.4	76,302	61.5	−69.0	Bu.	512,262	50.9	2,175,203	64.7	−76.4
3	Winter wheat	2,466	7.2	26,326	62.7	63.1	Bu.	35,513	17.4	490,400	66.4	35.7
4	Spring wheat	40,470	27.5				Bu.	630,098	50.8			
5	Barley	3,099	38.9	4,982	58.2	−37.8	Bu.	58,741	50.8	112,699	59.6	−47.9
6	Rye	541	1.3	375	24.7	44.3	Bu.	4,415	2.3	6,121	20.9	−27.9
	Other grains and seeds:											
7	Clover and alfalfa seed [2]	2,386	53.1	(3)	.....	.....	Bu.	7,584	47.9	(3)	.....	.....
	Hay and forage:											
8	Timothy alone	18,645	61.3	18,265	62.1	2.1	Tons.	18,824	63.9	28,136	63.0	−33.1
9	Timothy and clover mixed	25,601	75.9	4,086	50.7	526.6	Tons.	32,359	77.3	8,149	49.9	297.1
10	Clover alone	1,638	42.6	242	67.2	576.9	Tons.	1,811	45.0	586	72.5	209.0
11	Alfalfa	176,295	53.4	162,447	95.3	8.5	Tons.	284,423	55.3	379,933	95.5	−25.1
12	Other tame grasses	50,923	76.1	83,456	75.0	−39.0	Tons.	47,484	79.7	97,849	71.9	−51.5
13	Annual legumes cut for hay	778	33.7	4,930	25.2	100.0	Tons.	1,011	54.9	5,835	24.5	40.0
14	Small grains cut for hay	9,081	9.0				Tons.	7,160	14.4			
15	Wild, salt, or prairie grasses	142,750	62.9	189,271	78.0	−24.6	Tons.	116,168	67.1	182,033	79.8	−36.2
16	Silage crops	653	54.5	(3)	.....	.....	Tons.	3,787	58.7	(3)	.....	.....
17	Corn cut for forage	951	2.8	(3)	.....	.....	Tons.	2,317	9.4	(3)	.....	.....
	Vegetables:											
18	Potatoes	4,532	38.4	4,768	57.2	−4.9	Bu.	532,511	62.6	620,667	66.6	−14.2
	Miscellaneous:											
19	Sugar beets grown for sugar	2,714	27.3	1,100	93.1	146.7	Tons.	23,067	23.8	11,198	84.6	106.0

	CROP.	AVERAGE YIELD PER ACRE, 1919.						VALUE.				
		Unit.	For state.	On non-irrigated land.	On irrigated land.			1919		1909		Per cent of increase.[1]
					Average.	Per cent of average for state.	Per cent of average on non-irrigated land.	Amount.	Per cent of total for state.	Amount.	Per cent of total for state.	
	Cereals:											
1	Corn	Bu.	10.1	9.4	18.9	187.1	201.1	$85,534	13.3	$15,118	14.9	465.8
2	Oats	Bu.	17.2	14.1	21.6	125.6	153.2	563,488	50.9	1,302,033	71.2	−56.7
3	Winter wheat	Bu.	5.9	5.3	14.4	244.1	271.7	76,708	17.4	440,491	68.4	226.4
4	Spring wheat	Bu.	8.4	5.7	15.6	185.7	273.7	1,361,012	50.8			
5	Barley	Bu.	14.5	11.7	19.0	131.0	162.4	91,049	50.8	89,215	63.4	2.1
6	Rye	Bu.	4.6	4.6	8.2	178.3	178.3	7,726	2.3	4,999	33.8	54.6
	Other grains and seeds:											
7	Clover and alfalfa seed [2]	Bu.	3.5	3.9	3.2	91.4	82.1	144,096	47.9	(3)	.....	.....
	Hay and forage:											
8	Timothy alone	Tons.	0.97	0.90	1.01	104.1	112.2	489,424	63.9	208,307	61.0	135.0
9	Timothy and clover mixed	Tons.	1.24	1.17	1.26	101.6	107.7	776,616	77.3	71,810	54.1	981.5
10	Clover alone	Tons.	1.04	1.00	1.11	106.7	111.0	36,220	45.0	2,996	54.8	.....
11	Alfalfa	Tons.	1.56	1.49	1.61	103.2	108.1	6,541,729	55.3	2,526,657	96.1	158.9
12	Other tame grasses	Tons.	0.89	0.75	0.93	104.5	124.0	1,044,648	79.7	608,658	64.6	71.6
13	Annual legumes cut for hay	Tons.	0.80	0.54	1.30	162.5	240.7	19,209	54.9	52,741	26.3	221.5
14	Small grains cut for hay	Tons.	0.49	0.46	0.79	161.2	171.7	150,360	14.4			
15	Wild, salt, or prairie grasses	Tons.	0.76	0.68	0.81	106.6	119.1	2,729,948	67.1	1,384,269	77.7	97.2
16	Silage crops	Tons.	5.38	4.88	5.80	107.8	118.9	37,870	58.7	(3)	.....	.....
17	Corn cut for forage	Tons.	0.73	0.68	2.44	334.2	358.8	34,755	9.4	(3)	.....	.....
	Vegetables:											
18	Potatoes	Bu.	72.2	43.9	117.5	162.7	267.7	1,251,401	62.6	350,072	66.7	257.5
	Miscellaneous:											
19	Sugar beets grown for sugar	Tons.	9.76	10.24	8.50	87.1	83.0	242,204	23.8	51,779	85.8	367.8

[1] A minus sign (−) denotes decrease. Per cent not shown where more than 1,000. [2] Not including red clover seed. [3] Not reported separately in 1909.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (—) denotes decrease.]

		THE STATE.	Albany.	Big Horn.[1]	Campbell.[2]	Carbon.	Converse.[3]	Crook.[2]
1	Number of all farms in 1920	15,748	441	998	1,072	413	864	1,093
2	Number of farms irrigated in 1919	6,449	280	952	8	313	157	21
3	Per cent of all farms	41.0	63.5	95.4	0.7	75.8	18.2	1.9
4	Number of farms irrigated in 1909	6,297	339	1,018	.....	442	219	80
5	Per cent of increase, 1909–1919	2.4	—17.4	.....	.....	—29.2	.....	.....
	LAND AND FARM AREA.							
6	Approximate land area—acres	[4] 62,430,720	2,815,360	1,990,400	3,047,040	5,124,480	2,645,120	1,834,240
7	All land in farms—acres	11,809,351	847,732	190,445	860,748	843,520	770,484	949,975
8	Improved land in farms—acres	2,102,005	119,815	93,661	98,289	102,113	71,885	126,607
9	Area irrigated in 1919—acres	1,207,982	114,248	108,754	1,066	121,293	30,821	951
10	Per cent of improved land in farms	57.5	95.4	116.1	1.1	118.8	42.9	0.8
11	Area irrigated in 1909—acres	1,133,302	151,926	93,779	.....	131,749	40,607	6,712
12	Per cent of increase, 1909–1919	6.6	—24.8	.....	.....	—7.9	.....	.....
13	Area enterprises were capable of irrigating in 1920—acres	1,831,039	218,270	161,341	2,220	150,485	43,818	1,689
14	Area enterprises were capable of irrigating in 1910—acres	1,639,510	221,225	195,094	.....	163,394	52,159	8,017
15	Per cent of increase, 1910–1920	11.7	—1.3	.....	.....	—7.9	.....	.....
16	Area included in enterprises in 1920—acres	2,564,608	332,455	213,937	3,278	193,532	53,592	1,925
17	Area included in enterprises in 1910—acres	2,224,298	355,033	237,003	.....	191,486	85,713	11,038
18	Per cent of increase, 1910–1920	15.3	—6.4	.....	.....	1.1	.....	.....
19	Area of irrigated land reported as available for settlement—acres	197,326	1,000	19,900	.....	4,500	.....	.....
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	3,564	303	198	19	380	118	29
21	Number, 1910	5,577	436	430	.....	629	336	94
	Main ditches:							
22	Number, 1920	5,007	587	178	20	642	174	30
23	Number, 1910	5,593	487	418	.....	640	336	80
24	Length, 1920—miles	9,517	781	594	29	1,065	366	36
25	Length, 1910—miles	10,933	1,037	1,388	.....	1,065	485	91
26	Capacity, 1920—second-feet	39,009	4,669	2,904	109	3,057	2,259	350
27	Capacity, 1910—second-feet	42,630	6,831	5,124	.....	3,801	1,364	257
	Laterals:							
28	Number, 1920	2,777	103	114	8	156	53	41
29	Number, 1910	2,340	200	100	.....	173	87	73
30	Length, 1920—miles	2,534	142	206	5	121	115	7
31	Length, 1910—miles	2,298	588	140	.....	142	62	28
	Reservoirs:							
32	Number, 1920	374	30	12	14	25	10	13
33	Number, 1910	414	33	15	.....	36	23	52
34	Capacity, 1920—acre-feet	2,911,748	132,114	2,203	2,438	[5] 10,336	20,798	56
35	Capacity, 1910—acre-feet	2,550,937	372,888	1,060	.....	38,973	37,353	1,916
	Flowing wells:							
36	Number, 1920	7	.....	.....	.....	1	1	.....
37	Number, 1910	2	.....	.....	.....	1	.....	.....
38	Capacity, 1920—gallons per minute	46	.....	.....	.....	.....	40	.....
39	Capacity, 1910—gallons per minute	250	.....	.....	.....	100	.....	.....
	Pumped wells:							
40	Number, 1920	16	.....	1	2	5	1	.....
41	Number, 1910	3	.....	.....	.....	.....	.....	.....
42	Capacity, 1920—gallons per minute	8,020	.....	900	2,005	.....	180	.....
43	Capacity, 1910—gallons per minute	835	.....	.....	.....	.....	.....	.....
	Pumping plants:							
44	Number, 1920	57	.....	6	2	6	3	3
45	Number, 1910	34	.....	9	.....	2	2	1
46	Engine capacity, 1920—horsepower	1,304	.....	202	82	40	51	23
47	Engine capacity, 1910—horsepower	705	.....	143	.....	21	312	1
48	Pump capacity, 1920—gallons per minute	39,725	.....	2,250	2,005	1,287	1,782	1,391
49	Pump capacity, 1910—gallons per minute	142,529	.....	6,690	.....	1,500	123,560	7
50	Average lift, 1920—feet	31	.....	14	70	17	35	13
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920—dollars	34,326,328	3,975,710	4,495,690	85,100	[5] 1,193,535	862,217	20,912
52	Capital invested to July 1, 1910—dollars	17,700,980	2,682,679	2,310,660	.....	737,851	1,729,146	86,578
53	Per cent of increase, 1910–1920	93.9	48.2	.....	.....	61.8	.....	.....
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	18.75	18.21	27.80	38.33	7.93	19.68	—12.38
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	10.80	12.13	11.84	.....	4.52	33.15	10.80
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920—dollars	51,500,288	3,998,180	6,104,440	88,100	[5] 1,253,535	914,367	20,912
57	Estimated final cost of existing enterprises in 1910—dollars	20,425,890	4,114,507	2,370,693	.....	738,776	2,264,508	86,578
58	Per cent of increase, 1910–1920	152.1	—2.8	.....	.....	69.7	.....	.....
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	20.08	12.03	28.53	26.88	6.48	17.07	10.86
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	9.18	11.59	10.00	.....	3.86	26.42	7.84

[1] Part taken to form Park County in 1911; parts taken to form parts of Hot Springs and Washakie Counties in 1913.
[2] Campbell County formed from parts of Crook and Weston Counties in 1913.
[3] Part taken to form Niobara County in 1913.
[4] Includes 1,886,720 acres in Yellowstone National Park.
[5] Entire capacity and cost of Pathfinder Reservoir reported in Natrona County although reservoir lies in Carbon and Natrona Counties. Incorrectly reported in Laramie County in 1910.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease.]

		Fremont.[1]	Goshen.[2]	Hot Springs.[3]	Johnson.	Laramie.[4]	Lincoln.[5]	Natrona.
1	Number of all farms in 1920	969	1,511	197	624	1,178	923	183
2	Number of farms irrigated in 1919	827	324	127	227	64	749	52
3	Per cent of all farms	85.3	21.4	64.5	36.4	5.4	81.1	28.4
4	Number of farms irrigated in 1909	610	.....	.....	247	577	.....	183
5	Per cent of increase, 1909–1919	.....	.....	.....	−8.1	.....	.....	−71.6
	LAND AND FARM AREA.							
6	Approximate land area—acres	7,847,040	1,399,040	1,296,000	2,664,960	1,713,920	5,724,800	3,400,080
7	All land in farms—acres	449,331	890,778	117,309	472,611	1,008,343	441,212	220,002
8	Improved land in farms—acres	120,291	205,765	24,644	71,232	250,630	182,091	14,285
9	Area irrigated in 1919—acres	115,067	55,481	16,443	63,383	24,165	168,428	10,385
10	Per cent of improved land in farms	95.7	27.0	66.7	89.0	9.6	92.5	72.7
11	Area irrigated in 1909—acres	78,783	.....	.....	54,838	122,021	.....	22,498
12	Per cent of increase, 1909–1919	.....	.....	.....	15.6	.....	.....	−53.8
13	Area enterprises were capable of irrigating in 1920—acres	197,406	85,142	21,125	82,933	29,990	245,723	14,020
14	Area enterprises were capable of irrigating in 1910—acres	170,946	.....	.....	75,301	166,909	.....	29,255
15	Per cent of increase, 1910–1920	.....	.....	.....	10.1	.....	.....	−49.0
16	Area included in enterprises in 1920—acres	370,472	138,452	23,333	97,830	50,590	288,057	21,018
17	Area included in enterprises in 1910—acres	211,834	.....	.....	104,492	177,252	.....	36,837
18	Per cent of increase, 1910–1920	.....	.....	.....	−6.4	.....	.....	−40.5
19	Area of irrigated land reported as available for settlement—acres	72,440	27,453	.....	.....	.....	1,213	.....
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	385	69	72	150	90	586	61
21	Number, 1910	396	.....	.....	221	462	.....	273
	Main ditches:							
22	Number, 1920	494	103	52	174	212	820	84
23	Number, 1910	384	.....	.....	224	459	.....	277
24	Length, 1920—miles	1,148	236	160	513	260	1,410	142
25	Length, 1910—miles	892	.....	.....	529	827	.....	334
26	Capacity, 1920—second-feet	4,323	1,803	431	1,724	618	5,299	238
27	Capacity, 1910—second-feet	3,449	.....	.....	2,050	5,852	.....	1,040
	Laterals:							
28	Number, 1920	342	130	15	68	47	693	6
29	Number, 1910	136	.....	.....	39	200	.....	230
30	Length, 1920—miles	228	195	19	113	18	308	14
31	Length, 1910—miles	250	.....	.....	31	270	.....	114
	Reservoirs:							
32	Number, 1920	31	30	9	8	28	14	17
33	Number, 1910	10	.....	.....	6	60	.....	52
34	Capacity, 1920—acre-feet	6,314	27,728	488	3,871	[6]3,032	847,718	[6]1,081,264
35	Capacity, 1910—acre-feet	2,168	.....	.....	5,125	1,196,215	.....	6,119
	Flowing wells:							
36	Number, 1920	1	.....	.....	.....	.....	.....	.....
37	Number, 1910	.....	.....	.....	.....	.....	.....	.....
38	Capacity, 1920—gallons per minute	.....	.....	.....	.....	.....	.....	.....
39	Capacity, 1910—gallons per minute	.....	.....	.....	.....	.....	.....	.....
	Pumped wells:							
40	Number, 1920	.....	.....	.....	.....	2	.....	.....
41	Number, 1910	1	.....	.....	.....	.....	.....	.....
42	Capacity, 1920—gallons per minute	.....	.....	50	.....	735	.....	3,000
43	Capacity, 1910—gallons per minute	120	.....	.....	.....	.....	.....	.....
	Pumping plants:							
44	Number, 1920	5	.....	6	3	2	.....	4
45	Number, 1910	2	.....	.....	3	3	.....	5
46	Engine capacity, 1920—horsepower	82	.....	58	49	20	.....	166
47	Engine capacity, 1910—horsepower	13	.....	.....	31	66	.....	76
48	Pump capacity, 1920—gallons per minute	2,480	.....	4,020	1,100	735	.....	8,850
49	Pump capacity, 1910—gallons per minute	340	.....	.....	1,455	3,278	.....	3,211
50	Average lift, 1920—feet	90	.....	26	33	12	.....	19
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920—dollars	3,784,769	3,680,421	141,450	861,860	[6]267,853	1,694,382	[6]2,207,139
52	Capital invested to July 1, 1910—dollars	1,099,026	.....	.....	552,515	2,467,260	.....	201,416
53	Per cent of increase, 1910–1920	.....	.....	.....	56.0	.....	.....	[6]995.8
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	19.17	43.23	6.70	10.39	8.93	(7)	(7)
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	6.43	.....	.....	7.34	14.78	.....	6.88
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920—dollars	11,646,044	6,596,902	146,450	878,536	[6]268,853	1,741,382	[6]2,208,139
57	Estimated final cost of existing enterprises in 1910—dollars	1,122,491	.....	.....	552,515	3,139,090	.....	201,416
58	Per cent of increase, 1910–1920	.....	.....	.....	59.0	.....	.....	[6]996.3
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	31.44	47.65	6.28	8.98	5.31	(7)	(7)
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	5.30	.....	.....	5.29	17.71	.....	5.47

[1] Part taken to form part of Hot Springs County in 1913.
[2] Formed from part of Laramie County in 1913.
[3] Formed from parts of Big Horn, Fremont, and Park Counties in 1913.
[4] Parts taken to form Goshen and Platte Counties in 1913.
[5] Formed from part of Uinta County in 1913.
[6] Entire capacity and cost of Pathfinder Reservoir reported in Natrona County although reservoir lies in Carbon and Natrona Counties. Incorrectly reported in Laramie County in 1910.
[7] Average not shown because most of land served by storage works lies in another state.

COUNTY TABLE.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease.]

		Niobrara.[1]	Park.[2]	Platte.[3]	Sheridan.	Sweetwater.	Uinta.[4]	Washakie.[5]	Weston.[6]
1	Number of all farms in 1920	739	839	1,146	972	139	408	318	721
2	Number of farms irrigated in 1919	2	756	404	420	90	359	275	42
3	Per cent of all farms	0.3	90.1	35.3	43.2	64.7	88.0	86.5	5.8
4	Number of farms irrigated in 1909		602		679	135	1,123		43
5	Per cent of increase, 1909–1919				−38.1	−33.3			
	LAND AND FARM AREA.								
6	Approximate land area, acres	1,666,560	3,332,480	1,360,000	1,647,360	6,716,800	1,340,160	1,434,240	1,537,920
7	All land in farms, acres	633,708	286,193	974,429	625,796	61,245	324,475	93,379	747,576
8	Improved land in farms, acres	60,614	89,683	180,303	113,385	13,938	56,551	37,607	68,616
9	Area irrigated in 1919, acres	759	77,527	66,753	68,311	14,010	102,695	41,179	6,263
10	Per cent of improved land in farms	1.3	86.4	37.0	60.2	100.5	181.6	109.5	9.1
11	Area irrigated in 1909, acres		58,853		94,141	10,798	260,020		6,577
12	Per cent of increase, 1909–1919				−27.4	29.7			
13	Area enterprises were capable of irrigating in 1920, acres	1,102	121,465	108,639	90,198	46,805	148,553	50,597	8,618
14	Area enterprises were capable of irrigating in 1910, acres		108,478		114,285	22,667	303,704		8,076
15	Per cent of increase, 1910–1920				−21.1	106.5			
16	Area included in enterprises in 1920, acres	1,427	180,716	131,362	108,667	57,591	222,643	60,349	12,542
17	Area included in enterprises in 1910, acres		265,255		117,563	90,614	330,103		10,075
18	Per cent of increase, 1910–1920				−7.6	−36.4			
19	Area of irrigated land reported as available for settlement, acres			46,000		20,480	1,140	3,200	
	IRRIGATION WORKS.								
	Independent enterprises:								
20	Number, 1920	7	202	178	203	82	308	70	54
21	Number, 1910		313		526	107	1,306		48
	Main ditches:								
22	Number, 1920	15	175	289	239	127	437	84	71
23	Number, 1910		302		537	102	1,296		51
24	Length, 1920, miles	17	501	451	606	212	701	189	100
25	Length, 1910, miles		813		939	151	2,369		73
26	Capacity, 1920, second-feet	161	2,668	1,869	2,189	606	2,474	559	699
27	Capacity, 1910, second-feet		3,870		2,111	1,269	5,381		222
	Laterals:								
28	Number, 1920		228	293	131	76	53	22	198
29	Number, 1910		77		252	15	634		34
30	Length, 1920, miles		348	289	106	61	116	35	88
31	Length, 1910, miles		103		240	5	316		9
	Reservoirs:								
32	Number, 1920	4	24	24	28	26	9	2	16
33	Number, 1910		12		78	13	7		17
34	Capacity, 1920, acre-feet	457	463,641	270,895	11,252	19,505	2,864	60	3,724
35	Capacity, 1910, acre-feet		461,020		2,361	24,716	400,099		924
	Flowing wells:								
36	Number, 1920				2	2			
37	Number, 1910						1		
38	Capacity, 1920, gallons per minute				6				
39	Capacity, 1910, gallons per minute						150		
	Pumped wells:								
40	Number, 1920			3	2				
41	Number, 1910				1	1			
42	Capacity, 1920, gallons per minute			1,150					
43	Capacity, 1910, gallons per minute				660	55			
	Pumping plants:								
44	Number, 1920			8	4	3		1	1
45	Number, 1910		1		2	2	1		1
46	Engine capacity, 1920, horsepower			72	373	44		26	16
47	Engine capacity, 1910, horsepower		1		18	16	1		6
48	Pump capacity, 1920, gallons per minute			5,120	4,900	1,505		1,200	1,100
49	Pump capacity, 1910, gallons per minute		6		1,360	855	17		250
50	Average lift, 1920, feet			21	42	39		58	10
	CAPITAL INVESTED.								
51	Capital invested to Jan. 1, 1920, dollars	23,195	5,640,280	1,642,905	1,096,497	892,577	729,264	859,652	170,920
52	Capital invested to July 1, 1910, dollars		4,233,566		550,599	129,949	867,034		52,101
53	Per cent of increase, 1910–1920				99.1	586.9			
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920, dollars	21.05	46.44	15.12	12.16	19.07	4.91	16.99	19.83
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910, dollars		39.03		4.82	5.73	2.86		6.45
	ESTIMATED FINAL COST.								
56	Estimated final cost of existing enterprises in 1920, dollars	27,170	9,862,433	1,907,605	1,040,157	910,727	744,344	921,952	219,560
57	Estimated final cost of existing enterprises in 1910, dollars		4,233,566		550,599	129,949	869,101		52,101
58	Per cent of increase, 1910–1920				88.9	600.8			
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920, dollars	19.04	54.57	14.52	9.57	15.81	3.34	15.28	17.51
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910, dollars		15.96		4.68	1.43	2.63		5.17

[1] Formed from part of Converse County in 1913.
[2] Formed from part of Big Horn County in 1911; part taken to form part of Hot Springs County in 1913.
[3] Formed from part of Laramie County in 1913.
[4] Part taken to form Lincoln County in 1913.
[5] Formed from part of Big Horn County in 1913.
[6] Part taken to form Campbell County in 1913.

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DEPARTMENT OF COMMERCE

BUREAU OF THE CENSUS

WASHINGTON

FOURTEENTH CENSUS OF THE UNITED STATES

IRRIGATION

1919 AND 1920

UNITED STATES

Prepared under the direction of WILLIAM LANE AUSTIN, Chief Statistician for Agriculture

By R. P. TEELE, Special Agent for Irrigation

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1922

SUMMARY FOR THE UNITED STATES.

INTRODUCTION.

This summary presents the statistics of irrigation collected at the census of 1920 for the 17 arid and semiarid states of the United States, comprising the states of Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming and for the states of Arkansas and Louisiana, in which, together with the eastern part of Texas, irrigation is confined largely to rice growing. In the eastern states there are small areas irrigated for the growing of fruit and truck crops, but statistics for these states are not included in the general tables presented. Statistics of acreage irrigated, of acreage, yield, and value of crops grown on irrigated land, and of cost of operation and maintenance relate to the year 1919; other items relate to the year 1920. Throughout this summary figures for the census of 1910 are given for purposes of comparison; and, for the purpose of showing the historical development of irrigation, items which have been reported in censuses previous to 1910 are presented.

Statistics of number of farms irrigated and of acreage, yield, and value of crops grown on irrigated land were collected in the general census of agriculture. All other statistics were obtained in a special canvass of irrigation enterprises.

TABLE 1.—SUMMARY: 1920 AND 1910.

ITEM.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
Number of all farms	1,916,391	1,776,046	140,345	7.9
Approximate land area of states included.....acres	1,223,989,120	1,224,063,360	[2]−74,240	([3])
All land in farms in states included.....acres	505,440,954	416,462,547	88,978,407	21.4
Improved land in farms in states included.....acres	214,689,819	186,786,227	27,903,592	14.9
Number of farms irrigated	231,541	162,723	68,818	42.3
Area irrigated.....acres	19,191,716	14,433,285	4,758,431	33.0
Area enterprises were capable of irrigating.....acres	26,020,477	20,285,403	5,735,074	28.3
Area included in enterprises.....acres	35,890,821	32,245,464	3,645,357	11.3
Per cent irrigated:				
Number of all farms	12.1	9.2	2.9	.....
Approximate land area	1.6	1.2	0.4	.....
Land in farms	3.8	3.5	0.3	.....
Improved land in farms	8.9	7.7	1.2	.....
Excess of area enterprises were capable of irrigating over area irrigated.....acres	6,828,761	5,852,118	976,643	16.7
Excess of area included in enterprises over area irrigated.....acres	16,699,105	17,812,179	−1,113,074	−6.2
Area of irrigated land reported as available for settlement.....acres	2,257,981	([4])	2,257,981	.....
Capital invested	$697,657,328	$321,454,008	$376,203,320	117.0
Average per acre enterprises were capable of irrigating	$26.81	$15.85	$10.96	69.1
Estimated final cost of existing enterprises	$819,778,005	$437,948,825	$381,829,180	87.2
Average per acre included in enterprises	$22.84	$13.58	$9.26	68.2
Average cost of operation and maintenance per acre	$2.43	[5]$1.07	.....	.....
IRRIGATION WORKS.				
Number of enterprises	63,298	56,858	6,440	11.3
Number of main ditches	51,621	46,677	4,944	10.6
Length of main ditches.....miles	103,177	88,927	14,250	16.0
Capacity of main ditches.....second-feet	631,079	618,097	12,982	2.1
Number of lateral ditches	57,553	36,513	21,040	57.6
Length of lateral ditches.....miles	56,687	30,003	26,684	88.9
Number of reservoirs	7,538	6,956	582	8.4
Capacity of reservoirs.....acre-feet	21,246,436	12,602,924	8,643,512	68.6
Number of flowing wells	4,606	5,071	−465	−9.2
Capacity of flowing wells.....gallons per minute	935,057	1,345,676	−410,619	−30.5
Number of pumped wells	32,094	15,971	16,123	101.0
Capacity of pumped wells.....gallons per minute	16,396,549	7,248,699	9,147,850	126.2
Number of pumping plants	29,458	15,803	13,655	86.4
Engine capacity.....horsepower	748,971	361,480	387,491	107.2
Pump capacity.....gallons per minute	36,275,005	19,355,864	16,919,141	87.4
Average lift.....feet	50	.....	.....	.....

[1] A minus sign (−) denotes decrease.
[2] Decrease due to the building of several reservoirs in connection with irrigation projects.
[3] Less than one-tenth of 1 per cent decrease.
[4] Not reported in 1910.
[5] Does not include cost of operation and maintenance for rice growing districts in Gulf states; consequently figures for 1919 and 1909 are not comparable.

MAP OF THE UNITED STATES SHOWING APPROXIMATE LOCATION AND EXTENT OF IRRIGATED AREAS

EXPLANATION OF TERMS.

Farms irrigated.—The number of "farms irrigated" is the number on which irrigation is practiced, and for the purposes of this inquiry a "farm" is defined as for the general census of agriculture; that is, to be classed as a farm an establishment either must be 3 acres in extent or must have produced crops to the value of $250 in 1919, or must have required for its agricultural operations the continuous services of at least one person. "Number of farms irrigated" as used in this report and in that of 1910, is equivalent to the term "number of irrigators" used in census reports on irrigation previous to 1910.

Irrigation enterprise.—An "enterprise" is an independent irrigation establishment and includes the works for supplying water and the land to which water is supplied or is to be supplied, except that the cost or value of the land is not included in the "capital invested."

Acreage irrigated, in enterprises, and available for settlement.—Acreage irrigated is the acreage to which water was actually applied in the season preceding the census year—1919 for the Fourteenth Census and 1909 for the Thirteenth Census.

Acreage to which enterprises were capable of supplying water relates to the season following the time of taking the census and, consequently, is based on estimates made by those controlling the enterprises.

Acreage included in enterprises represents the extent of the plans of those controlling enterprises.

Acreage of irrigated land reported as available for settlement relates to land within existing enterprises and not to land that is susceptible of reclamation and settlement by new enterprises or extensions of existing enterprises.

Types of enterprises.—The types of enterprises under which all data are classified are as follows:

United States Reclamation Service enterprises, which operate under the Federal law of June 17, 1902, providing for the construction of irrigation works with the receipts from the sale of public lands. In addition to serving land within its own projects, the United States Reclamation Service supplies stored water to land within other enterprises.

United States Indian Service enterprises, which operate under various acts of Congress providing for the construction by that service of works for the irrigation of land in Indian reservations.

Carey Act enterprises, which operate under the Federal law of August 18, 1894, granting to each of the states in the arid region 1,000,000 acres of land on condition that the state provide for its irrigation, and under amendments to that law granting additional areas to Idaho and Wyoming.

Irrigation districts, which are public corporations that operate under state laws providing for their organization and management, and empowering them to issue bonds and levy and collect taxes with the object of obtaining funds for the purchase or construction and for the operation and maintenance of irrigation works.

Cooperative enterprises, which are controlled by the water users under some organized form of cooperation. The most common form of organization is the stock company, the stock of which is owned by the water users.

Commercial enterprises, which supply water for compensation to parties who may own no interest in the works.

Individual and partnership enterprises, which belong to individual farmers or to neighboring farmers, who control them without formal organization.

Capital invested.—The capital invested in irrigation enterprises is that reported by the owners. For the larger works the capital invested is taken, in most cases, from books of account and represents the actual investment. In the case of most of the private and partnership and many of the cooperative enterprises, however, the works were built by their owners without records of money or labor expended, and the capital reported represents the owners' estimates. The schedules used in 1910 called for "cost," while the schedule used in the present census calls for "capital invested," but the instructions accompanying the schedules make these two terms equivalent. In both cases the investment includes cost of construction and of acquiring rights. The latter usually consists of filing fees only, but in some instances it includes the purchase price of rights. However, these cases are so rare that they are unimportant. The cost reported for 1900 is designated "cost of construction," but probably includes the cost of acquiring rights, as in 1910. For the Thirteenth and Fourteenth Censuses the average cost per acre is based on the acreage which enterprises were capable of irrigating in the census year and the cost to the date of the census—January 1, 1920, for the Fourteenth Census, and July 1, 1910, for the Thirteenth Census.

Operation and maintenance.—Cost of operation and maintenance was not reported on all schedules, and averages are based on the acreages for which cost is reported. No estimate of total cost of operation and maintenance for all irrigation enterprises has been made. In the case of enterprises operating pumping plants the cost of operation and maintenance includes cost of fuel and attendance.

Water rights.—The acreage irrigated has been classified by the character of rights under which water is received. The classes used are defined as follows:

"*Appropriation and use*" includes all rights acquired without formalities of any kind that have not been defined by the courts.

"*Notice filed and posted*" includes rights for which claims of some kind have been either posted or filed that have not been defined by the courts.

"*Adjudicated by court*" includes all rights that have been defined by the courts.

"*Permit from state*" includes all rights initiated under laws requiring any party wishing to acquire rights to obtain a permit from the state.

"*Certificate or license from the state*" includes rights acquired under laws providing for the issuing by the state of certificates or licenses defining rights acquired.

"*Riparian rights*" includes rights based on the ownership of riparian land.

"*Underground*" represents water taken from wells.

Source of water supply.—In classifying acreage by source of supply from which water for irrigation is obtained, in 1910 acreage was credited to what seemed to be the principal source of supply, while in the census of 1920 the attempt is made to represent the facts more nearly by presenting various mixed classes.

Date of beginning.—The date of beginning of irrigation enterprises is, in some cases, the date when construction began, and, in other cases, the date of filing a claim or of applying for a permit. If a filing or application for permit was made and work was begun and continued with reasonable diligence the date of filing is considered the date of beginning, otherwise the date of construction is taken as the date of beginning.

Drainage basin.—The drainage basin of a stream is all of the land drained by the stream and its tributaries.

Units of quantity and capacity.—Capacities of canals, reservoirs, wells, pumps, and engines, and quantities of water used are expressed in the units commonly used in engineering literature to express the same items. They are as follows:

Capacities of canals and volumes of flowing water are given in second-feet, a shorter equivalent for cubic feet per second.

Capacities of wells and pumps are given in gallons per minute. Four hundred and fifty gallons per minute equal 1 second-foot.

Capacities of reservoirs are given in acre-feet. An acre-foot is the quantity of water that will cover 1 acre to a depth of 1 foot. It equals 43,560 cubic feet.

Capacities of engines and motors are given in horsepower. One horsepower is the power required to lift 33,000 pounds through a vertical distance of 1 foot in 1 minute of time.

CLIMATIC CONDITIONS.

The climatic conditions having the largest influence in determining the necessity for irrigation are the amount and seasonable distribution of precipitation, particularly rainfall, while wind movement and relative humidity also have an influence.

In that part of the United States lying east of the arid and semiarid states named in the introduction to this summary the normal annual precipitation exceeds 25 inches and is so distributed throughout the year as to provide sufficient moisture for the growing of general farm crops. In this section short periods of drought occur sufficiently often to make irrigation desirable for such crops as truck and small fruits, which may be damaged to a large extent by lack of moisture for even short periods, although the irrigation of these crops is not general. Seasons with too little rainfall for the proper growth of general crops occur, but not sufficiently often to justify making provision for irrigation.

Arkansas, Louisiana, and eastern Texas have a normal annual precipitation of from 40 to 50 inches, which is ample for all crops except rice. It is necessary to keep water standing on rice fields during most of the growing period of this crop, and for this the rainfall is not sufficient. Irrigation in this section is practically confined to the rice fields.

The states of North and South Dakota, Nebraska, Kansas, Oklahoma, and western Texas lie in the so-called semiarid region, and have a normal annual precipitation varying from about 15 inches at their western boundaries to about 25 or more inches at their eastern boundaries. In this section success in growing crops without irrigation varies from year to year according to the amount and distribution of the rainfall, and the practice of irrigation advances eastward and recedes to the west with periods of deficient or excessive rainfall.

The same condition exists on the plains in the eastern parts of Montana, Wyoming, Colorado, and New Mexico. Here crops are grown on the high plains without irrigation, with varying success, while irrigation is generally practiced in the stream valleys.

The main ranges of the Rocky Mountains extend through Montana, Wyoming, Colorado, and New Mexico. On the high mountains the precipitation, particularly snowfall, is heavy, while in the valleys between the ranges the precipitation is light and irrigation is necessary for the growing of most crops.

West of the Rocky Mountains and between them and the Sierra Nevada and Cascade Mountains and extending from the Mexican boundary to central Idaho is the real arid region of the United States. Here the normal annual precipitation varies from about 2 inches in southwestern Arizona and southeastern California to about 8 inches in southern Idaho. In this section, comprising the larger parts of Arizona, Nevada, and Utah, and considerable parts of California, Oregon, Washington and Idaho, almost no crops can be grown in the valleys without irrigation. On the higher lands in Arizona, Utah, Idaho, Oregon, and Washington the precipitation is greater and grain and forage crops are grown without irrigation. Northern Idaho, northwestern Montana, and northeastern Washington receive sufficient precipitation for growing crops without irrigation.

West of the Sierra Nevada and Cascade Mountains there is a great variation in rainfall. The western coast of Washington and Oregon receives the heaviest precipitation of any part of the United States, but there is a dry period in the late summer, during which irrigation is desirable for crops which make their growth during this period. Irrigation is practiced to a limited extent for pastures, vegetables, and fruits.

Throughout California there is a well-defined wet season in the winter months, and an equally well-defined dry season in summer. Most of the northern part of the state receives sufficient rainfall to mature crops if it were distributed throughout the year, but the growing of crops in late summer requires irrigation. On the other hand, most of the southern part of the state receives less moisture than is usually considered necessary for crop growing, but the concentration of the year's precipitation in the winter and spring makes it possible to mature crops where it would not be possible were the rainfall more widely distributed throughout the year.

Climatic conditions during the year 1919 were abnormal in many places. In eastern Montana and Wyoming and western North Dakota and South Dakota, 1919 was the third year in succession in which the precipitation was below normal. The condition not only damaged crops grown without irrigation but greatly decreased the supply of water available for irrigation, and much land was not irrigated in 1919 that would have been if water had been available. On the other hand, at the southern end of the semiarid region, in Oklahoma, Texas, and New Mexico, the precipitation in 1919 was far above normal and much land that is irrigated ordinarily was not watered in 1919 because of the heavy rainfall.

In the inter-mountain region, in Arizona, Nevada, Utah, Idaho, Oregon, and Washington, the precipitation in 1919 was far below normal, and the same condition existed in the central valleys of California. It is probable that in all of the states named in this paragraph the acreage irrigated in 1919 was smaller than it would have been had water been more plentiful.

WATER SUPPLY FOR IRRIGATION.

Streams supply the water used on by far the greater part of the land irrigated in the United States, 83 per cent of the acreage receiving its entire supply from this source in 1919, and 2 per cent additional receiving part of its supply from streams. The streams in the western states have one common characteristic—they are subject to heavy floods in the spring and early summer and become very low in late summer. This condition makes it necessary to store a part of the flood flow for use in the late summer if the largest use of the water supply is to be made.

Both flowing and pumped wells supply water to considerable areas. The use of water from these sources in most sections comes only after the supply from streams is exhausted, or nearly so, and represents a later and usually more expensive stage of development than the use of stream water. Wells furnished the entire water supply for 7 per cent of the acreage irrigated in 1919, and a part of the supply to 2 per cent of this acreage. Streams and wells combined supplied 92 per cent of the total acreage irrigated in 1919. The other sources are, therefore, almost negligible.

The water supply in the several states is discussed in detail in the state bulletins.

The northern half of the Great Plains, extending from the Rocky Mountains toward Mississippi River, is drained by Missouri River and its tributaries. In most of this area some crops can be grown without irrigation, and the irrigated land is confined almost exclusively to the stream valleys. The Missouri itself is not very largely utilized, and many of its tributaries are in the same condition. Storage has been provided for only a small part of the flood flow of the main stream and its tributaries north of the Platte, and there is in these streams a large supply of water available for future development in Wyoming, Montana, and the Dakotas.

The North Platte supplies large areas in Colorado, Wyoming, and Nebraska. Its low-water flow is largely utilized and storage has been provided in the Pathfinder Reservoir in central Wyoming for a large part of the flood water of this stream, but there is a considerable supply for additional storage, which would make it possible to extend the area irrigated considerably.

The South Platte waters a large area of land in Colorado and a small area in Nebraska. Its low-water flow is fully utilized. On this stream the flood water and winter flow is stored in many small reservoirs rather than in one large reservoir. While most of the flood water is stored there is some water available for further development of the same kind on the lower part of the stream.

Water stored on the North Platte can be used on the main Platte in Nebraska and there is water from floods, winter flow, and return seepage that could be stored on the main stream if the demand for water justified the expense. Uncertainty as to the need for irrigation and as to the water supply have retarded development in this section.

The central part of the Great Plains is drained by Arkansas River and its tributaries. The Arkansas waters a large area in Colorado and a small area in Kansas. The low-water flow of the Arkansas is all used, and a large part of the flood water is stored in small reservoirs, but there is still some water available for storage on the main stream and its tributaries.

Practically all of the land used for rice-growing in Arkansas and a considerable part of that in Louisiana and Texas is watered from wells. There is nothing to indicate that the water supply is not sufficient for a large expansion of the rice-growing area, if other conditions justify it.

The rice grown along the Gulf coast in Louisiana and Texas is supplied principally by pumping from streams entering the Gulf, which are so nearly at the Gulf level that heavy pumping at times causes the salt water of the Gulf to enter the streams. The supply of fresh water is limited unless storage is provided. This has not been done. In Texas water for rice is taken from streams at higher levels, and here the supply is insufficient in some seasons. There is ample water for storage.

Streams flowing to the Gulf of Mexico supply scattered areas throughout central Texas with water, and in northern Texas wells supply a considerable area. The water supply is sufficient for a large extension of irrigation from both sources, if other conditions justify it.

The Rio Grande and its tributaries drain south central Colorado, most of central and eastern New Mexico, and the southwestern part of Texas. Large areas are irrigated in Colorado, considerable areas in New Mexico, and a large area in Texas. The Rio Grande is subject to heavy floods and at times is dry or nearly so, and storage is necessary for permanently successful irrigation. The Elephant Butte Reservoir in south central New Mexico has sufficient capacity to store the flood water and to regulate the flow of the stream below. Water from this reservoir supplies land along the stream in New Mexico, in Texas, and in Mexico. There is little opportunity to use water from the Rio Grande below the El Paso Valley in Texas, except near the mouth of the river, where a large area is irrigated. The lower part of the river receives much of its water from tributaries in Mexico below El Paso and is not dependent on storage in Elephant Butte Reservoir. Most of the water used

for irrigation in this section is pumped from the river. At times the supply is low, but there is a good supply for storage, although reservoirs have not been built. The question of providing storage on this part of the Rio Grande is complicated by the fact that the river forms the boundary between the United States and Mexico, and until some agreement is reached between the two republics for the equitable division of the water supply, the extent of safe irrigation development on either side of the river can not be determined.

The Pecos, a tributary of the Rio Grande, drains a large part of southeastern New Mexico. It is subject to heavy floods and periods of very low discharge. Storage has been provided for a part of the flood flow, but there is opportunity for additional storage. There are many flowing wells in the valley of the Pecos in New Mexico.

The Colorado River system drains all the land west of the Rio Grande drainage area to the California boundary, and extends northward to northern Wyoming. It supplies water to land in Wyoming, Colorado, Utah, New Mexico, Nevada, Arizona, and California. In the upper states the areas of tillable land in the valleys of the tributaries of the Colorado are limited and much of the low-water flow of these streams is not yet utilized, while there is very little storage. Near the mouth of the stream very large areas are irrigated in Arizona, California, and Mexico. The low-water flow reaching this portion of the river is just about sufficient for the land now irrigated. Any considerable extension of the area watered will necessitate storage. A very large volume of flood water is available for storage, and Federal and local agencies are studying the possibilities of storing these flood waters. A compact between the states interested for the control of the river has been provided for by state and Federal legislation. Gila River, which is a tributary of Colorado River, and its tributaries drain a considerable part of western New Mexico and most of southern Arizona. All of these streams are subject to heavy floods and to periods with practically no discharge; consequently storage is necessary to make them reliable sources of water for irrigation. Little storage has been provided except on Salt River, where the Roosevelt Reservoir has sufficient capacity to store the entire flow of the stream above the reservoir. Tributaries reaching the stream below the reservoir are subject to violent floods, but no storage has been provided for these floods. In the irrigated section of the Salt River Valley ground water has come near the surface, making drainage necessary. Both wells and open ditches have been installed for the purpose of lowering the ground water and supplying additional water for irrigation. There is opportunity for more work of this kind.

North and west of the Colorado River basin lies the **Great Basin**, which has no outlet to the sea. This basin includes small parts of Wyoming, Idaho, California, and Oregon, and most of Utah and Nevada. It really consists of several independent drainage basins, one with the Great Salt Lake as its low point, another centering in the "sinks" in western Nevada, and a third consisting of the Sevier River drainage in southwestern Utah. There are also small basins in northern California and southern Oregon.

The Great Salt Lake receives almost its entire inflow from the mountains lying to the east of its basin. Jordan River, carrying the discharge of Utah Lake, enters at the south end, Bear River enters at the north end, and between these there are several short streams entering the lake. These are typical mountain streams with large flow when the snow melts in the spring and a small flow during the summer. Water is stored in Utah Lake for use in the Jordan Valley and in Bear Lake for use in the Bear River Valley. Water stored in Strawberry Reservoir, in the Colorado River drainage basin, is brought into this basin through a tunnel discharging into Spanish Fork River, a tributary of Utah Lake. The low-water flow of all the streams in this drainage basin is used, but there is opportunity for much additional storage.

The sinks in western Nevada receive water from both east and west. Humboldt River and its tributaries drain most of the eastern slope of this basin. The Humboldt has a flood period in spring and most of the irrigation along this stream consists in damming the stream so that it will overflow natural meadows on its bottom lands during its flood. A much larger use of the stream could be made if a part of the flood water were stored for use in the late summer.

Walker, Carson, and Truckee Rivers flow into the sinks from the west. These streams rise in California in the Sierra Nevada Mountains. Carson and Walker Rivers water considerable areas in both states. Truckee River is the outlet of Lake Tahoe, which lies on the border between California and Nevada. Plans for using Lake Tahoe for a storage reservoir have been made, but litigation has prevented this use to any large extent. Water from both Truckee and Carson Rivers is stored in Lahontan Reservoir in Nevada. There is opportunity for additional storage on all these streams.

Throughout the Great Basin there are large valleys which have no surface water supply. In some of these a good supply of ground water has been found. It is probable that large areas can be supplied from wells, when this becomes economically feasible.

North of the Great Basin and extending from western Montana and Wyoming to the Pacific Ocean is the Columbia River drainage basin. The Columbia and its tributaries water large areas in Montana, Idaho, Oregon, and Washington.

Clark Fork of the Columbia and its tributaries, the Bitterroot and Flathead, water lands in western Mon-

tana. Water is stored in Flathead Lake for lands near the lake. There is opportunity for storage on the other tributaries.

Snake River rises near the headwaters of the Missouri and Colorado in northwestern Wyoming and waters land in Idaho, Oregon, and Washington. Its low-water flow is all used, and storage has been provided for much of the flood water in Jackson Lake in Wyoming and in reservoirs in Idaho. There is still a large volume of flood water available for storage and plans are being made to provide reservoirs to store this water.

The Columbia itself is not extensively used for irrigation. Throughout its course it is so far below the level of the adjoining lands that extensive gravity diversions have not been made but some water is pumped from the river. It carries large volumes of water that could be used if its use were feasible.

The tributaries of the Columbia coming from the Cascade Mountains in Washington supply water to most of the land irrigated in that state. Their low-water flow is used, and storage has been provided for a part of the flood water. There is opportunity for additional storage.

The tributaries of the Columbia in Oregon supply a large part of the irrigated land in that state. Irrigation development in this part of Oregon has not reached the stage where flood water is stored. The water supply is sufficient for the irrigation of a much larger area than is now watered.

West of the Cascade Mountains in Washington and Oregon there is an abundant supply of water and very little irrigation because of the heavy rainfall. However, there is a dry period in the late summer when some land is irrigated. The water supply is sufficient for a very large extension of the irrigated area.

In northern California the dry season in summer is more pronounced than it is in Oregon and Washington, and at that time there is little water in the streams. There is a large supply available for storage, but little storage has been provided. Sacramento River waters a large area, and the summer flow is fully utilized. The stream is subject to very heavy floods, and almost no storage has been provided. Both Federal and state agencies are working on plans for storing the flood water of the Sacramento and its tributaries.

The San Joaquin and its tributaries supply water to the larger part of the irrigated land in California. The low-water discharge of these streams is all used, but very little provision for storing flood water has been made. State and private agencies are working on plans for large storage projects, which will provide water for a large additional area. In the San Joaquin Valley irrigation has brought the ground water near the surface and a great many wells and pumps have been put in, in some instances to furnish a supplemental supply of water when the streams are low, and in others to provide the entire water supply.

The coast streams south of San Francisco Bay are torrential in character. On some of these streams reservoirs have been built to store flood waters, but on many reservoir sites do not exist and large quantities of flood water waste to the ocean. In the valleys of these streams there are many wells, both flowing and pumped, and the heavy draft on the ground water has lowered its level. In the absence of reservoir sites, the flood waters are spread over the gravelly soil where the streams emerge from the mountains in order that they may enter the soil and replenish the ground-water supply. There is a large supply of flood water in southern California for which there is a large demand. If some practicable way of conserving these flood waters can be found the irrigated area can be extended greatly.

Taking the western part of the United States as a whole, with few exceptions, the low-water flow of the streams is exhausted, but there is a very large supply of flood water available for storage. There is no lack of tillable land on which this water can be used. Future extension of irrigation depends on whether economic conditions are such that the value of the crops which can be produced will justify the expense of storing the flood waters. The same may be said of the use of ground water. The extent of the supply of ground water is not so well known as the amount of flood water, but there are many places where water can be obtained from wells when the expense of pumping is justified.

FARMS AND ACREAGE IRRIGATED.

TABLE 2.—NUMBER OF FARMS AND ACREAGE IRRIGATED: 1890 TO 1920.

CENSUS YEAR.	FARMS IRRIGATED.			AREA IRRIGATED.				
	Number.	Per cent of increase.	Per cent of all farms.	Acres.	Per cent of increase.	Per cent of total land area.	Per cent of land in farms.	Per cent of improved land in farms.
1920	231,541	42.3	12.1	19,191,716	33.0	1.6	3.8	8.9
1910	162,723	43.0	9.2	14,433,285	86.4	1.2	3.5	7.7
1900	113,829	110.3	8.2	7,744,467	108.4	0.7	2.2	6.2
1890	54,136	.....	5.8	3,715,758	.....	0.3	2.1	3.8

TABLE 3.—ACREAGE, CLASSIFIED BY DATE OF BEGINNING OF ENTERPRISES SUPPLYING WATER FOR IRRIGATION.

DATE OF BEGINNING.	Number of enterprises.	Area included in enterprises, 1920 (acres).	AREA IRRIGATED IN 1919.		Area enterprises were capable of irrigating in 1920 (acres).
			Acres.	Per cent of acreage in enterprises.	
Total	63,298	35,890,821	19,191,716	53.5	26,020,477
Before 1860	696	469,006	299,784	63.9	356,573
1860–1869	2,170	1,916,572	1,282,705	66.9	1,432,801
1870–1879	3,663	4,246,246	2,588,414	61.0	3,378,758
1880–1889	7,854	6,256,086	4,043,391	64.6	4,889,859
1890–1899	6,186	4,564,393	2,538,913	55.6	3,560,098
1900–1904	4,808	3,840,247	2,211,749	57.6	2,963,840
1905–1909	5,588	5,863,374	2,549,927	43.5	3,815,217
1910–1914	11,600	3,938,999	1,538,644	39.1	2,460,015
1915–1919	12,542	3,256,554	1,165,560	35.8	1,965,204
Not reported	8,191	1,539,344	972,629	63.2	1,198,112

TABLE 4.—ACREAGE, CLASSIFIED BY SOURCE OF WATER SUPPLY: 1919 AND 1909.

CLASS.	AREA IRRIGATED (ACRES).				Area enterprises were capable of irrigating in 1920 (acres).	Area included in enterprises, 1920 (acres).
	1919	1909	Increase.[1]			
			Amount.	Per cent.		
Total	19,191,716	14,433,285	4,758,431	33.0	26,020,477	35,890,821
Streams, gravity	14,527,060	12,767,351	1,759,709	13.8	19,269,136	26,040,237
Streams, pumped	1,226,516	608,659	617,851	101.5	2,118,942	2,885,698
Streams, pumped and gravity	199,595	(2)	199,595	.....	237,700	284,353
Wells, pumped	1,263,098	489,341	773,757	158.1	1,674,819	2,356,748
Wells, flowing	65,856	144,420	−78,564	−54.4	79,777	131,137
Wells, flowing and pumped	35,685	(2)	35,685	.....	42,703	84,379
Lakes, pumped	35,730	17,826	17,904	100.4	59,760	80,564
Lakes, gravity	100,646	59,631	41,015	68.8	149,377	312,169
Springs	198,008	196,186	1,822	0.9	251,792	409,528
Stored storm water	98,873	105,792	−6,919	−6.5	223,434	319,972
City water	930	(2)	930	.....	1,401	1,666
Sewage	2,578	(2)	2,578	.....	3,301	5,540
Streams, gravity, and pumped wells	344,713	(2)	344,713	.....	389,790	465,293
Streams, gravity, and flowing wells	82,665	(2)	82,665	.....	104,569	205,121
Other mixed	996,621	44,079	952,542	.....	1,398,004	2,290,850
Other and not reported	13,148	(2)	13,148	.....	15,972	17,566

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not included in classification.

ACREAGE, BY CHARACTER OF ENTERPRISE.

The dates on which the different states enacted laws accepting the conditions of the Federal Carey Act (act of Aug. 18, 1894) and the dates on which they enacted their original irrigation district laws are given in the following table:

DATES OF ACCEPTING CAREY ACT AND OF ENACTING IRRIGATION DISTRICT LAWS.

STATE.	Date of accepting Carey Act.	Date of original irrigation district laws.	STATE.	Date of accepting Carey Act.	Date of original irrigation district laws.
Arizona	1912	1912	New Mexico	1909	1907
Arkansas	(1)	(2)	North Dakota	(3)	1917
California	1915	1887	Oklahoma	(3)	1915
Colorado	1895	1905	Oregon	1901	1895
Idaho	1895	1895	South Dakota	1909	1917
Kansas	(3)	1891	Texas	(1)	1905
Louisiana	(1)	(2)	Utah	1897	1865
Montana	1895	1907	Washington	1895	1890
Nebraska	(3)	1895	Wyoming	1895	1909
Nevada	1895	1891			

[1] Carey Act does not apply.
[2] Has no district law.
[3] Has not accepted Carey Act.

The United States Reclamation Act (act of June 17, 1902) applies to all of the states included in the irrigation census except Arkansas and Louisiana, and this service supplies water to some land in all of the states to which it applies except Kansas and Oklahoma. One small project was established in Kansas but it has been disposed of. No project has been undertaken in Oklahoma.

TABLE 5.—ACREAGE, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920 AND 1910.

ITEM AND CLASS.	CENSUS OF—		INCREASE.[1]	
	1920	1910	Amount.	Per cent.
ACREAGE IRRIGATED.				
Total	19,191,716	14,433,285	4,758,431	33.0
Individual and partnership	6,848,807	6,594,614	254,193	3.9
Cooperative	6,581,400	4,643,539	1,937,861	41.7
Irrigation district	1,822,887	528,642	1,294,245	244.8
Carey Act	523,029	288,653	235,376	81.6
Commercial	1,822,001	1,809,379	12,622	0.7
U. S. Reclamation Service	1,254,569	395,646	858,923	217.1
U. S. Indian Service	284,551	172,912	111,639	64.6
State	5,620	(2)	5,620	.....
City	40,146	(2)	40,146	.....
Other and mixed	7,236	(2)	7,236	.....
Not reported	570	(2)	570	.....
ACREAGE ENTERPRISES WERE CAPABLE OF IRRIGATING.				
Total	26,020,477	20,285,403	5,735,074	28.3
Individual and partnership	9,255,756	8,086,766	1,168,990	14.5
Cooperative	8,403,298	6,191,577	2,211,721	35.7
Irrigation district	2,531,425	800,451	1,730,974	216.2
Carey Act	804,298	1,089,677	−285,379	−26.2
Commercial	2,799,563	2,954,166	−154,603	−5.2
U. S. Reclamation Service	1,680,643	786,190	894,453	113.8
U. S. Indian Service	484,486	376,576	107,910	28.7
State	7,379	(2)	7,379	.....
City	44,458	(2)	44,458	.....
Other and mixed	8,546	(2)	8,546	.....
Not reported	625	(2)	625	.....
ACREAGE INCLUDED IN ENTERPRISES.				
Total	35,890,821	32,245,464	3,645,357	11.3
Individual and partnership	13,008,415	10,621,067	2,387,348	22.5
Cooperative	10,628,543	8,830,197	1,798,346	20.4
Irrigation district	3,432,109	1,581,465	1,850,644	117.0
Carey Act	1,188,937	2,573,874	−1,384,937	−53.8
Commercial	3,999,581	5,786,777	−1,787,196	−30.9
U. S. Reclamation Service	2,627,176	1,973,016	654,160	33.2
U. S. Indian Service	932,985	879,068	53,917	6.1
State	9,581	(2)	9,581	.....
City	49,650	(2)	49,650	.....
Other and mixed	13,144	(2)	13,144	.....
Not reported	700	(2)	700	.....

[1] A minus sign (−) denotes decrease.
[2] Not included in classification in 1910.

In addition to supplying water to land within its own projects the Reclamation Service, under the Warren Act (act of Feb. 21, 1911), furnishes, in most cases, stored water in bulk to supplement the supply of private systems otherwise dependent on unregulated stream flow. The area receiving such supplemental supply from the Reclamation Service varies from time to time, and was somewhat in excess of 900,000 acres in 1919. This area is not included in that credited to the Reclamation Service in any of the tables in this summary.

ACREAGE, BY CHARACTER OF WATER RIGHTS.

In the United States all laws relating to the character of rights and to the use of water are enacted by the several states. In 1866 Congress passed an act providing that rights "recognized and acknowledged by local customs, laws, and the decisions of courts" shall be maintained and protected (R. S., sec. 2339), and the United States Reclamation Act (act of June 17, 1902) recognizes state control over water. The Supreme Court of the United States also has upheld the exclusive right of the states to control the waters within their boundaries, subject only to the right of Congress to preserve and improve navigation. (Kansas *v.* Colorado, 206 U. S. 46).

Every one of the states in which irrigation is generally practiced, except Arkansas and Louisiana, where irrigation is limited almost exclusively to rice growing, has assumed some measure of public control over irrigation and rights to water. In Table 6 the acreage irrigated is classified with reference to the degree to which rights under which water is received are defined and controlled by public authority, and the nature of the control exercised.

TABLE 6.—ACREAGE IRRIGATED, CLASSIFIED BY CHARACTER OF RIGHTS UNDER WHICH WATER IS RECEIVED: 1919 AND 1909.

CLASS.	1919		1909 [1]
	Acres.	Per cent of total.	Per cent of total.
Total	19,191,716	100.0	100.0
Appropriation and use	2,521,682	13.1	34.0
Notice filed and posted	2,765,636	14.4	16.2
Adjudicated by court	7,159,953	37.3	35.3
Permit from state	1,960,924	10.2	6.7
Certificate or license from state	1,288,124	6.7	5.7
Riparian rights	370,896	1.9	2.1
Underground	1,067,096	5.6	.....
Other and mixed	494,564	2.6	.....
Not reported	[2] 1,562,330	8.1	.....

[1] Acreage irrigated for rice growing in Louisiana, Arkansas, and Texas not included.
[2] Acreage for Arkansas and Louisiana included.

The laws of the states relating to water rights are summarized in the following paragraphs. The areas served under rights of the different kinds for the United States as a whole are given in Table 6, and for the several states on page 36.

Appropriation and use.—In every one of the arid states the laws recognize the right of persons needing water for irrigation or other beneficial purposes to "appropriate" water from streams and other sources. This right is limited in various ways, and all of the states prescribe some procedure which shall be followed by those appropriating water. However, all of these states have in the past recognized rights acquired by merely taking and using water, in the absence of laws, or without conforming to the laws, when there are such. All rights acquired in this way that have not been passed upon by the courts or by some official body to which has been given the right to adjudicate water rights, are reported in this class in Table 6.

Notice filed and posted.—The first step in the public regulation of the appropriation of water was the enacting of laws requiring those intending to take water from streams or other sources to post notices at the points of intended diversion and to file copies of these notices with some public official, usually the county clerk or county recorder. In some cases notices were filed only. The names of the states in which such laws were enacted with the dates of enactment and the dates at which they were superseded by other laws are shown in the following table. The practice of posting and filing notices was so general that many notices were filed in states where there was no legislation on the subject.

DATES OF LAWS REQUIRING POSTING OR FILING OF NOTICES OF APPROPRIATION.

STATE.	Date of enactment of law.	Date when law was superseded.	STATE.	Date of enactment of law.	Date when law was superseded.
Arizona	1871	1919	New Mexico	1891	1907
California	1872	1913	North Dakota	[2] 1881	1905
Colorado	1881	(1)	Oklahoma	1897	1905
Idaho	1881	1903	South Dakota	[2] 1881	1905
Kansas	1886	(1)	Texas	1895	1913
Montana	1885	(1)	Utah	1897	1903
Nebraska	1889	1895	Washington	1889	1917
Nevada	1889	1893	Wyoming	1886	1890

[1] Still in force. [2] Territory of Dakota.

Defining of rights.—The fact that many rights to water have been acquired without public supervision and consequently are not defined as to date or extent when they are acquired has created the necessity for the defining of such rights by some public authority. Originally rights were defined in ordinary suits between water users whose claims conflicted, but this led to such a multiplicity of suits that most of the states in which irrigation is generally practiced have enacted laws providing either some special procedure in the courts for the adjudication of rights or for adjudication by some board or official, or for a combination of the two systems in which testimony is taken, surveys

are made, and decrees are prepared by boards or officials, but the decrees are issued by the courts. In all of the states, rights were defined by the courts before any other system was adopted, and some of the states have changed their systems more than once.

The laws of the various states and the periods during which they were in force are shown in the following table:

METHODS OF DEFINING RIGHTS TO WATER AND PERIODS OF TIME DURING WHICH THEY HAVE BEEN IN FORCE.

STATE.	Defined by courts without the aid of state officials or boards.	Defined by courts on basis of information collected by state officials or boards.	Defined by state boards or officials.
Arizona	Until 1919.	1919 to date.	
Arkansas	To date.		
California	Until 1913.	1913 to date.	
Colorado	To date.		
Idaho	To date.[1]		
Kansas	To date.		
Louisiana	To date.		
Montana	To date.		
Nebraska	Until 1895.		1895 to date.
Nevada	Until 1903.	1915 to date.	1903–1915.
New Mexico	Until 1907.	1907 to date.	
North Dakota	Until 1905.	1905 to date.	
Oklahoma	Until 1905.	1905 to date.	
Oregon	Until 1909.	1909 to date.	
South Dakota	To date.[1]		
Texas	Until 1917.	1917 to date.	
Utah	Until 1903.	1903 to date.	
Washington	Until 1917.	1917 to date.	
Wyoming	Until 1890.		1890 to date.

[1] Law providing otherwise declared unconstitutional.

Permits, certificates, and licenses from state.—The names of the states requiring a party wishing to acquire rights to water to apply to some state board or official for a permit and providing for the issuing of a certificate or license setting forth the rights acquired, with the dates of the laws, are given in the following table:

STATE.	Date of law.	STATE.	Date of law.
Arizona	1919	Oklahoma	1905
California	1913	Oregon	1909
Idaho	1903	South Dakota	1905
Nebraska	1895	Texas	1913
Nevada	1905	Utah	1903
New Mexico	1907	Washington	1917
North Dakota	1905	Wyoming	1890

Riparian rights.—The states that recognize riparian rights to some extent are as follows: California, Kansas, Montana, Oregon, South Dakota, Texas, and Washington.

ACREAGE, BY DRAINAGE BASIN.

The report of a special census taken in 1902 presented all data by drainage basins rather than by counties. The results of the census of 1920 have been tabulated on the same basis, and the data for 1902 are presented for purposes of comparison. For no other census have the results been tabulated in this form. The acreage reported for each drainage basin in 1919 comprises all the irrigated land in that drainage basin, including that watered from springs and wells. In the 1902 results the acreages irrigated from springs and wells were not reported for the smaller tributary streams, but the acreages for the tributaries were included in those reported for the main streams. This area is so small, however, that the comparison of the areas reported for the tributary streams is not seriously affected.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Total	19,191,716	8,874,408	116.3	35,890,821	26,020,477
Missouri River and tributaries	4,147,278	2,533,237	63.7	8,483,171	5,805,630
Missouri River direct	27,707	20,834	33.0	92,270	62,559
Jefferson River and tributaries	425,685	231,788	83.7	831,898	574,672
Jefferson River direct	21,276	15,721	35.3	40,347	34,894
Beaverhead River	145,673	99,014	47.1	296,079	199,797
Big Hole River	184,655	67,422	173.9	306,885	227,920
Boulder River	7,265	9,333	−22.2	40,677	13,297
Passamari River	34,474	21,101	63.4	76,107	48,036
Other tributaries of Jefferson River	32,342	[2]19,197	68.5	71,803	50,728
Madison River	34,425	20,338	69.3	88,524	62,065
Gallatin River	95,063	58,004	63.9	228,056	152,515
Smith River	16,861	18,677	−9.7	38,369	29,691
Sun River	31,785	32,927	−3.5	244,071	95,522
Teton River	44,945	34,961	28.6	146,468	82,241
Marias River	63,758	22,188	187.4	308,158	122,431
Judith River	15,173	44,672	−66.0	40,993	35,459
Musselshell River	45,559	87,233	−47.8	141,363	113,964
Milk River and tributaries	108,555	56,597	91.8	349,716	179,063
Milk River direct	19,766	24,305	−18.7	26,358	23,443
Sage Creek		4,947		2,850	1,750
Snake River	910	2,135	−57.4	3,130	2,275
Other tributaries of Milk River	87,879	[2]25,210	248.6	317,378	151,595
Missouri River and tributaries—Continued.					
Yellowstone River and tributaries	889,025	427,559	107.9	1,826,870	1,322,304
Yellowstone River direct	189,453	40,015	373.5	279,211	262,801
Clark Fork and tributaries	77,736	69,195	12.3	141,007	130,627
Clark Fork direct	72,525	67,488	7.5	130,736	121,813
Tributaries of Clark Fork	5,211	1,707	205.3	10,271	8,809
Shields River	25,940	19,836	30.8	94,238	53,062
Stillwater River	23,561	13,572	73.6	34,278	29,664
Big Horn River and tributaries	358,949	115,520	210.7	842,297	534,404
Big Horn River direct	93,902	4,147		182,331	123,151
Popo Agie River	22,073	14,340	53.9	34,723	34,375
Wind River	43,620	3,787		228,338	77,122
Poison Creek	5	2,690	−99.8	10	10
Owl Creek	11,610	6,558	77.0	14,546	12,951
No Wood River	18,416	10,099	82.4	26,193	22,080
Greybull River	49,231	35,552	38.5	93,543	79,134
Shell Creek	11,955	4,319	176.8	24,005	22,406
Shoshone River	95,091	26,311	261.4	217,998	134,431
Little Horn River	1,408	4,761	−70.4	11,353	4,340
Other tributaries of Big Horn River	11,638	2,956	293.7	29,257	24,404
Rosebud River	365	13,618	−97.3	1,365	1,305
Tongue River and tributaries	54,195	48,245	12.3	100,563	80,693

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.

[2] Includes springs and wells.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902—Continued.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Missouri River, etc.—Con.					
Yellowstone River, etc.—Con.					
Tongue River—Con.					
Tongue River direct	20,975	19,907	5.4	43,075	32,174
Goose Creek	27,627	20,653	33.8	43,817	37,749
Other tributaries of Tongue River	5,593	7,685	−27.2	13,671	10,770
Powder River and tributaries	89,631	66,747	34.3	138,856	117,181
Powder River direct	3,193	2,390	33.6	10,846	9,803
Red Fork Creek	3,341	2,610	28.0	4,271	3,385
Crazy Woman Creek	21,965	6,950	216.0	29,684	24,151
Clear Creek	50,648	47,801	6.0	71,560	63,735
Other tributaries of Powder River	10,484	6,996	49.9	22,495	16,107
Other tributaries of Yellowstone River	69,195	[2] 40,811	69.5	195,055	112,567
Little Missouri River	1,080	3,730	−71.0	7,398	4,803
Moreau River	305	335	−9.0	3,094	1,721
Cheyenne River and tributaries	110,143	66,487	65.7	197,288	159,083
Cheyenne River direct	99,333	49,547	100.5	176,715	143,847
North Fork (Belle Fourche)	1,966	6,173	−68.2	5,054	3,621
South Fork and tributaries	8,844	10,555	−16.2	15,519	11,615
South Fork direct	5,906	7,906	−25.3	11,764	7,910
Hat Creek	2,938	2,649	10.9	3,755	3,705
Other tributaries of Cheyenne River		212			
White River	8,008	9,706	−17.5	21,922	16,939
Niobrara River	6,138	8,185	−25.0	28,956	10,265
Platte River and tributaries	2,136,402	1,286,343	66.1	3,431,037	2,579,720
Platte River direct	37,532	30,887	21.6	151,377	68,732
North Platte River and tributaries	872,140	[3] 548,781	58.9	1,603,305	1,172,858
North Platte River direct	351,050	170,470	105.9	579,728	429,252
Beaver Creek	2,621	7,370	−64.4	3,666	3,186
Grand Encampment Creek	7,053	6,622	6.5	10,173	7,293
Spring Creek	13,123	7,679	70.9	18,702	1,177
Sage Creek	375	1,634	−77.1	570	570
Pass Creek	8,557	8,390	2.0	12,500	11,373
Medicine Bow River	54,500	40,661	34.0	139,599	67,103
Sweetwater River	5,448	11,403	−52.2	14,166	10,593
Muddy Creek	657	1,525	−56.9	1,112	677
Box Elder Creek	4,648	4,740	−1.9	7,916	7,696
La Prele Creek	9,103	4,524	101.2	21,697	15,690
Labonte Creek	4,376	3,639	20.3	6,525	5,756
Laramie River and tributaries	156,159	138,176	13.0	373,353	298,153
Laramie River direct	78,560	57,335	37.0	177,979	129,116
Little Laramie River	30,860	53,105	−41.9	42,852	33,144
Sybille Creek	6,183	7,234	−14.5	9,519	8,044
North Laramie River	6,858	5,721	19.9	20,144	11,749
Chugwater Creek	5,914	3,907	51.4	9,853	9,258
Other tributaries of Laramie River	27,784	10,874	155.5	113,006	100,842
Rawhide Creek	2,045	4,187	−51.2	3,651	2,481
Horse Creek	28,369	15,524	82.7	71,188	39,702
Blue River	7,376	4,929	49.6	7,391	7,391
Pumpkin Creek	7,273	2,314	214.3	10,554	9,168
Other tributaries of North Platte River	209,407	49,250	325.2	320,814	238,597
South Platte River and tributaries	1,224,974	691,342	77.2	1,671,199	1,335,109
South Platte River direct	362,191	229,388	57.9	519,535	398,310
Bear Creek	8,778	11,174	−21.4	12,093	10,373
Clear Creek	79,172	76,259	3.8	84,450	79,940
St. Vrain Creek	244,831	96,583	153.5	281,467	265,731
Big Thompson Creek	96,678	68,806	40.5	105,673	98,711
Cache la Poudre River	267,197	146,280	82.7	291,702	282,307
Lone Tree Creek	4,928	1,444	241.3	124,506	7,327
Crow Creek	4,525	3,643	24.2	13,040	7,117
Big Beaver Creek	6,429	17,100	−62.4	11,825	10,699
Lodgepole Creek	20,004	12,306	62.6	33,823	25,646
Other tributaries of South Platte River	130,241	28,359	359.3	193,085	148,948
Loup River	1,177	12,872	−90.9	4,512	2,377
Other tributaries of Platte River	579	2,461	−76.5	644	644
Kansas River and tributaries	34,072	22,344	55.2	53,644	44,402
Republican River	34,360	21,022	63.4	52,080	43,022
Smoky Hill River	278	770	−63.9	1,450	1,266
Big Blue River	19	[4]		44	44
Other tributaries of Kansas River	15	552	−97.3	70	70
Other tributaries of Missouri River	51,989	80,329	−35.3	403,070	156,151
Mississippi River and tributaries exclusive of Missouri River	958,493	393,687	143.5	1,543,064	1,152,261
Mississippi River direct	17,416			24,070	23,755
Arkansas River and tributaries	851,150	393,085	116.5	1,344,646	1,009,921
Arkansas River direct	514,702	234,594	119.4	629,409	553,690
South Fork	10,401	5,422	91.8	12,374	10,430
Fountain River	20,465	13,870	47.5	39,224	24,964
St. Charles River	11,855	3,432	245.4	22,310	13,791
Huerfano River	55,528	14,078	294.4	103,554	64,474
Apishapa River	8,292	4,089	102.8	65,015	11,430
Purgatoire or Las Animas River and tributaries	43,922	20,393	115.4	52,083	47,870
Purgatoire or Las Animas River direct	43,533	19,702	121.0	51,172	47,402
Trinchera River	389	691	−43.7	911	468
Canadian River and tributaries	90,876	57,412	58.3	180,804	137,882
Canadian River direct	2,371	2,365	0.3	3,022	2,615
Cimarron River	31,967	8,122	293.6	70,318	45,628
Vermejo River	23,678	4,110	476.1	23,978	23,878
Ocate Creek	4,861	1,380	252.2	13,908	13,095
Mora River	17,057	32,796	−48.0	36,670	29,528
Ute Creek	77	4,061	−98.1	709	519
Other tributaries of Canadian River	10,865	[2] 4,578	137.3	32,199	22,619
Cimarron River	8,345	[2] 10,427	−20.0	25,312	21,472
Other tributaries of Arkansas River	86,764	[2] 29,368	195.4	213,961	123,918
St. Francis River	4,965	[4]		14,198	5,920
White River	74,918	[4]		131,346	95,709
Ouachita River	42	[4]		140	105
Red River and tributaries	7,149	282		23,306	13,378
Other tributaries of Mississippi River	2,853	[2] 320	791.6	5,358	3,473
Gulf streams other than Mississippi River and Rio Grande	698,077	21,833		1,602,169	1,157,529
Atchafalaya River and tributaries	23,342	[4]		31,920	30,885
Vermilion River and tributaries	74,034	[4]		138,066	126,649
Mermentau River and tributaries	268,840	[4]		458,463	382,755
Calcasieu Lake, River and tributaries	54,318	[4]		169,193	137,178
Sabine River and tributaries	25,857	[4]		5 318	41,358
Neches River	64,900	[4]		149,800	82,000
Trinity River	42,770	[4]		96,320	52,720
Brazos River	7,535	448		22,896	19,560
Colorado River	71,278	10,402	585.2	277,268	125,066
San Antonio River	13,179	2,955	346.0	61,789	60,177
Nueces River	13,753	2,663	416.4	50,006	31,977
Other Gulf streams	38,271	[2] 5,365	613.3	101,130	66,604
Rio Grande and tributaries	1,293,863	496,587	160.6	2,594,127	1,887,433
Rio Grande direct	684,718	246,106	178.2	1,386,144	1,099,365
Saguache River	38,032	11,730	224.2	41,447	39,363
San Luis River	51,329	3,079		175,871	68,309
Alamosa River	35,601	15,753	126.0	72,528	40,551
La Jara River	10,627	[4]		15,424	12,005
Conejos River	88,676	44,035	101.4	115,887	95,680
Trinchera River	12,485	3,768	231.3	59,699	19,319
Rio Costilla River	4,417	2,115	108.8	7,385	4,803
Pueblo River	11,780	7,075	66.5	12,443	11,791
Rio Chama	26,166	8,549	206.1	42,235	30,237
Rio Santa Cruz	9,171	3,086	197.2	9,863	9,221
Tesuque Creek	3,012	4,744	−36.5	3,411	3,183
Rio Puerco	14,309	2,927	388.9	42,877	25,991
Pecos River and tributaries	176,458	78,855	123.8	397,443	281,150
Pecos River direct	119,848	34,691	245.5	274,243	198,286
Gallinas River	4,097	6,281	−34.8	41,810	24,201
Hondo River	20,561	24,608	−16.4	33,118	23,525
Penasco River	13,375	5,102	162.2	19,389	13,733
Other tributaries of Pecos River	18,577	[2] 8,173	127.3	28,383	21,405
Los Moras Creek	1,469	680	116.0	1,534	1,519
Other tributaries of Rio Grande	125,613	[2] 63,485	97.9	209,936	144,946
Independent streams in Rio Grande drainage basin	18,992	8,355	127.3	34,026	26,852
Rio Mimbres	12,557	[2] 6,546	91.8	24,243	19,554
Fresno River	1,798	200	799.0	3,598	2,331
Rio Tularosa	4,547	1,568	190.0	6,095	4,877
Other independent streams	90	[3] 41		90	90

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.
[3] Includes 65,744 acres in Colorado for which main stream was not reported.
[4] Not reported separately in 1902.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902—Continued.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Colorado River and tributaries	2,312,047	927,183	149.4	4,064,492	2,986,937
Colorado River direct	495,710	18,713	.....	728,326	551,506
Green River and tributaries	586,387	254,951	130.0	1,148,821	855,264
Green River direct	22,826	12,723	79.4	36,121	31,072
New Fork	27,743	10,975	152.8	53,918	43,614
Horse Creek	15,520	6,569	136.3	21,670	19,453
Cottonwood Creek	17,437	4,673	273.1	32,317	29,283
South Piney Creek	11,928	16,179	−26.3	30,924	26,307
La Barge Creek	5,459	5,055	8.0	11,700	7,725
Fontenelle Creek	4,428	3,241	36.6	5,858	5,033
Bitter Creek	2,395	1,405	70.5	12,495	11,447
Blacks Creek	65,980	28,139	134.5	175,970	104,305
Henrys Fork	8,298	6,813	21.8	25,940	23,694
Ashley Fork River	26,787	15,834	69.2	44,087	44,087
Duchesne River	138,446	(2)	.....	322,689	217,809
Price River	23,811	6,621	259.6	37,191	24,848
San Rafael River	77,290	21,546	258.7	85,028	80,028
Yampa River and tributaries	81,661	[3] 76,422	6.9	142,636	102,861
Yampa River direct	18,029	(2)	.....	28,221	18,832
Little Snake River	23,080	17,363	32.9	34,280	28,807
Other tributaries of Yampa River	40,552	(2)	.....	80,135	55,222
White River	25,625	22,752	12.6	40,441	29,238
Other tributaries of Green River	30,753	[4] 16,004	92.2	69,836	54,370
Grand River and tributaries	595,041	304,474	95.4	1,066,252	752,334
Grand River direct	81,698	41,721	95.8	150,037	119,778
Fraser River	9,331	2,676	248.7	27,010	10,795
Muddy Creek	5,050	4,105	23.0	7,255	5,075
Blue River	10,541	2,794	277.3	16,297	11,771
Eagle River	15,118	10,885	39.1	28,435	15,586
Roaring Fork	30,738	21,050	46.0	47,305	34,104
Plateau Creek	26,260	13,380	96.3	40,757	25,616
Gunnison River and tributaries	250,913	150,254	67.0	409,034	329,756
Gunnison River direct	16,813	9,000	86.8	21,649	19,909
Taylor River	560	12,018	−95.3	620	620
Tomichi Creek	21,752	10,152	114.3	30,208	23,068
North Fork	31,006	17,174	80.5	57,189	33,891
Smith Fork River	15,314	5,954	157.2	31,340	25,600
Uncompahgre River	86,119	56,399	52.7	139,756	137,756
Other tributaries of Gunnison River	79,349	39,557	100.6	129,082	88,912
Rio Dolores	74,916	21,560	247.5	180,611	84,973
Other tributaries of Grand River	90,476	36,069	150.8	158,611	114,880
Fremont River	26,513	15,701	68.9	42,005	34,005
Virgin River	35,350	15,651	125.9	100,242	45,558
San Juan River and tributaries	140,807	55,224	154.6	251,188	167,488
San Juan River direct	23,031	8,232	179.8	51,021	28,443
Mancos River	9,040	5,115	76.7	18,149	9,494
Los Pinos River	30,022	6,603	355.4	55,586	42,033
Animas River	41,174	17,391	136.8	73,413	47,974
La Plata River	23,004	9,977	130.6	29,918	23,765
Other tributaries of San Juan River	14,336	7,916	81.1	23,101	15,779
Kanab Wash	450	700	−35.7	710	610
Williams River	1,653	1,256	31.6	3,232	1,809
Little Colorado River and tributaries	17,036	11,855	43.7	35,358	21,880
Little Colorado River direct	10,260	7,270	41.1	20,821	14,131
Nutrioso Creek	636	320	98.8	1,224	952
Concho Creek	244	163	49.7	500	250
Other tributaries of Little Colorado River	5,896	4,102	43.7	12,813	6,547
Gila River and tributaries	401,400	233,113	72.2	658,416	544,014
Gila River direct	83,406	60,620	37.6	210,531	174,229
San Francisco River	3,591	4,907	−26.8	11,134	3,859
San Pedro River	7,773	10,912	−28.8	18,959	10,861
Santa Cruz River	33,019	10,606	211.3	76,617	45,115
Salt River and tributaries	247,260	140,642	75.8	277,034	268,644
Salt River direct	235,825	125,007	88.6	253,603	253,398
Tonto Creek	502	1,829	−72.6	2,928	720
Rio Verde	6,564	11,502	−42.9	9,978	7,470
Other tributaries of Salt River	4,369	2,304	89.6	10,525	7,146
Agua Fria River	18,824	884	.....	38,099	30,000
Hassayampa River	956	1,091	−12.4	3,657	1,773
Other tributaries of Gila River	6,571	3,451	90.4	21,785	9,533
Other tributaries of Colorado River	11,900	15,545	−23.4	29,942	12,469
Whitewater Draw and tributaries	5,371	384	.....	16,623	9,950
Great Basin Drainage	2,313,163	1,639,473	41.1	4,238,028	2,869,858
Tributaries of Great Salt Lake	818,630	534,861	53.7	1,249,721	989,919
Bear River and tributaries	480,452	274,071	75.3	685,746	547,673
Bear River direct	249,100	89,632	177.9	360,256	290,577
Little Bear River	46,541	38,592	20.6	48,358	46,890
Malad River	1,189	(2)	.....	1,935	1,189
Thomas Fork	8,905	6,116	45.6	8,929	8,905
Mill Creek	2,973	6,561	−54.7	10,028	5,238
Little Malad Creek	16,679	9,024	84.8	43,404	17,128
Other tributaries of Bear River	155,065	124,146	24.9	212,836	177,746
Weber River and tributaries	97,589	80,355	21.4	149,081	112,981
Weber River direct	44,726	41,967	6.6	83,796	49,341
Ogden River	21,881	22,373	−2.2	27,097	26,852
East Canyon Creek	6,202	4,414	40.5	6,538	6,468
Other tributaries of Weber River	24,777	11,601	113.6	31,650	30,320
Jordan River and tributaries and Utah Lake	270,598	180,435	50.0	414,894	329,265
Jordan River direct	48,052	32,401	48.3	90,495	55,720
Spanish Fork River	61,434	23,778	158.4	96,176	83,142
Hobble Creek	5,620	18,424	−69.5	6,589	5,946
Provo River	51,782	36,939	48.3	62,703	56,672
American Fork River	19,146	20,446	−6.4	20,371	20,241
Little Cottonwood Creek	12,144	7,673	58.3	16,698	16,691
Big Cottonwood Creek	10,991	8,813	24.7	13,207	12,271
Other tributaries of Jordan River	58,429	[4] 31,061	82.8	108,655	78,582
Independent streams	1,464,524	1,104,612	32.6	2,988,307	1,879,939
Sevier River and tributaries	325,718	131,048	148.5	630,484	402,387
Sevier River direct	153,651	59,257	159.3	351,553	226,199
San Pitch River	77,616	42,502	82.6	105,519	78,318
Otter Creek	7,289	5,260	38.6	7,845	7,289
South Fork	18,325	3,495	424.3	32,620	19,170
Other tributaries of Sevier River	68,837	20,534	235.2	132,947	71,381
Beaver River	28,732	15,599	84.2	53,729	46,469
Coal Creek	27,206	2,845	856.3	60,891	33,893
Deep Creek (Utah)	1,983	1,515	30.9	4,326	3,446
Grouse Creek	3,469	990	250.4	4,599	3,639
Humboldt River and tributaries	197,778	219,767	−10.0	348,573	231,251
Humboldt River direct	69,180	97,742	−29.2	84,049	77,726
East Fork of Humboldt River	33,473	11,680	186.6	74,264	43,649
La Moille Creek	22,278	7,765	186.9	40,610	26,065
North Fork of Humboldt River	7,940	3,960	100.5	28,697	10,470
South Fork of Humboldt River	33,052	26,733	23.6	48,338	41,261
Pine Creek	3,250	1,010	221.8	3,530	3,250
Reese	11,178	14,906	−25.0	40,769	10,898
Little Humboldt River	6,350	31,562	−79.9	6,790	6,350
Other tributaries of Humboldt River	11,071	[4] 24,409	−54.6	21,526	11,582
Truckee River and tributaries	20,002	40,541	−50.7	34,659	20,920
Truckee River direct	14,606	32,748	−55.4	28,040	15,436
Steamboat Creek	3,152	7,000	−55.0	3,298	3,218
Other tributaries of Truckee River	2,244	[4] 793	183.0	3,321	2,266
Carson River and tributaries	75,439	74,950	0.7	233,668	104,404
Carson River direct	27,810	70,838	−60.7	35,413	30,670
Other tributaries of Carson River	47,629	[4] 4,112	.....	198,255	73,794
Walker River and tributaries	152,625	107,030	42.6	400,232	179,502
Walker River direct	152,055	106,960	42.2	397,772	178,212
Other tributaries of Walker River	570	[4] 70	.....	2,460	1,350
Duck Creek	6,252	4,109	52.2	13,855	7,872
Steptoe Creek	3,708	6,705	−44.7	12,069	3,628
Long Valley Creek	12,543	4,060	208.9	18,840	15,951
Mono Lake and tributaries	4,190	3,818	9.7	70,377	45,760
Susan River	31,784	23,533	35.1	36,225	33,313
Mohave River	4,608	540	753.3	21,523	6,510
Owens River	144,024	51,902	177.5	200,147	182,748
San Jacinto River	20,869	5,040	314.1	34,974	22,263
Whitewater River	14,643	(2)	.....	37,604	22,282
Quinn River	9,935	38,150	−74.0	19,635	13,452
Deep Creek (Oregon)	1,906	2,165	−12.0	2,118	2,088
Donner and Blitzen River	21,356	34,701	−38.5	54,931	27,956
Silver Creek	16,819	13,609	23.6	42,779	17,394

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.
[2] Not reported separately in 1902.
[3] Includes 59,059 acres in Colorado for which main stream was not reported.
[4] Includes springs and wells.

TABLE 7.—ACREAGE IRRIGATED, CLASSIFIED BY DRAINAGE BASIN: 1919 AND 1902—Continued.

DRAINAGE BASIN.	AREA IRRIGATED (ACRES).			Area included in enterprises, 1920 (acres).	Area enterprises were capable of irrigating in 1920 (acres).
	1919	1902	Per cent of increase.[1]		
Great Basin drainage—Con					
Independent streams—Con.					
Silvies River	64,842	26,041	149.0	102,258	95,867
Thomas Creek	5,386	1,980	172.0	5,866	5,466
Other independent streams	268,707	[2] 293,974	−8.6	543,945	351,358
Columbia River and tributaries	3,873,245	1,297,437	198.5	6,336,801	4,968,518
Columbia River direct	24,563	782	.....	49,432	32,615
Kootenai River	5,982	2,600	130.1	14,423	9,724
Clark Fork and tributaries	286,290	229,851	24.6	603,088	444,928
Clark Fork direct	3,188	8,808	−63.8	15,834	5,786
Missoula River and tributaries	238,769	221,043	8.0	433,021	325,992
Missoula River direct	2,550	1,181	115.9	8,322	5,777
Hellgate River	77,381	78,139	−1.0	165,391	108,161
Big Blackfoot River	40,604	36,622	10.9	83,716	61,476
Bitter Root River	112,622	98,955	13.8	158,241	139,481
Other tributaries of Missoula River	5,612	[2] 6,136	−8.5	17,351	11,097
Flathead River	44,333	[3]	.....	154,233	113,150
Colville River	6,960	310	.....	18,200	13,993
Spokane River and tributaries	20,614	210	.....	50,860	27,356
Spokane River direct	16,453	210	.....	40,391	21,675
Coeur d'Alene Lake and River	4,161	[3]	.....	10,469	5,681
Okanogan River and tributaries	20,583	2,257	812.0	42,042	30,261
Okanogan River direct	2,357	14	.....	3,708	2,899
Salmon Creek	6,729	1,095	514.5	11,478	11,238
Other tributaries of Okanogan River	11,497	[2] 1,148	901.5	26,856	16,124
Methow River	12,579	1,675	651.0	24,017	16,529
Entiat River	2,054	2,919	−29.6	2,652	2,251
Wenatchee River	23,734	3,285	622.5	39,288	34,568
Crab Creek	6,088	1,937	214.3	10,400	8,048
Yakima River and tributaries	337,293	121,705	177.1	436,797	353,644
Yakima River direct	254,262	66,371	283.1	345,373	269,163
Wilson Creek	11,207	6,613	70.8	12,042	11,807
Naches River	19,864	20,232	−1.8	21,656	20,284
Ahtanum River	9,287	3,849	141.3	9,982	9,342
Other tributaries of Yakima River	42,583	[2] 24,640	72.8	47,744	43,048
Snake River and tributaries	2,712,618	807,044	236.1	4,057,747	3,376,146
Snake River direct	744,066	66,397	.....	948,252	897,088
Gros Ventre River	6,718	3,523	90.7	9,866	7,493
Little Gros Ventre River	6,243	3,599	73.5	9,157	6,997
Salt River	34,338	22,570	52.1	57,288	46,234
Pierre River and tributaries	.....	5,372	−100.0	.....	.....
Henrys Fork	208,534	85,793	143.1	325,114	286,514
South Fork of Snake River	151,597	52,326	189.7	207,292	102,473
Blackfoot River	53,910	9,035	496.7	77,255	60,225
Port Neuf River	37,996	18,528	105.1	75,023	59,270
Raft River	23,620	23,793	−0.7	42,906	26,436
Goose Creek	25,000	2,000	.....	50,000	50,000
Salmon Falls River	41,330	[3]	.....	87,260	49,920
Little Wood River	30,153	[3]	.....	97,867	55,475
Big Wood River	117,748	33,961	246.7	203,795	178,497
Bruneau River	22,598	13,930	62.2	37,751	25,636
Owyhee River	104,330	21,840	380.0	239,242	118,238
Boise River	328,395	84,438	288.9	388,313	368,854
Malheur River	52,850	40,686	29.9	117,688	79,618
Payette River	123,072	50,893	141.8	165,142	117,011
Weiser River	58,869	26,769	119.9	79,925	69,718
Burnt River	34,287	16,042	113.7	54,467	37,506
Powder River	146,036	58,482	149.7	188,463	165,826
Pine Creek	12,635	10,149	24.5	40,637	39,321
Imnaha River	4,828	3,781	27.7	10,146	6,069
Salmon River	115,108	58,403	97.1	224,527	163,036
Grande Ronde River	79,257	22,628	250.3	98,912	87,317
Clearwater River	4,623	1,944	137.8	5,777	5,545
Asotin Creek	3,051	3,225	−5.4	4,051	4,051
Pataha River	1,480	619	139.1	2,302	2,209
Palouse River	1,735	508	241.5	3,645	2,020
Other tributaries of Snake River	137,711	65,810	109.3	204,724	169,549
Independent streams in Snake River Basin	109,913	44,011	149.7	353,251	182,811
Camas Creek	17,490	4,107	325.9	95,199	46,190
Beaver Creek	1,502	2,330	−35.5	2,590	1,970
Medicine Lodge	5,019	3,225	55.6	12,445	8,390
Little Lost River	11,552	6,825	69.3	31,452	18,732
Big Lost River	72,788	23,547	209.1	204,845	105,727
Columbia River, etc.—Con.					
Independent streams, etc—Con.					
Other independent streams	1,562	[2] 3,977	−60.7	6,720	1,802
Walla Walla River	39,784	9,649	312.3	54,614	47,745
Klickitat River	12,332	372	.....	19,241	13,440
White Salmon River	6,247	912	585.0	11,958	7,277
Umatilla River	43,571	4,485	871.5	99,012	83,341
Willow Creek	5,553	3,013	84.3	7,159	6,618
John Day River	36,141	27,604	30.9	48,191	41,492
Deschutes River	111,916	21,108	430.2	291,014	174,790
Hood River	19,765	2,837	596.7	30,660	21,101
Willamette River	2,892	448	545.5	4,656	4,302
Other tributaries of Columbia River	25,773	8,423	206.0	59,099	35,538
Pacific Ocean streams other than the Colorado and Columbia Rivers	3,570,687	1,556,232	129.4	6,978,320	5,155,509
Dungeness River	6,160	685	799.3	12,660	9,800
McDowell Creek	.....	200	−100.0	.....	.....
Rogue River and tributaries	38,569	13,900	177.5	131,131	52,816
Rogue River direct	3,256	538	505.2	14,166	4,673
Little Butte Creek	6,706	1,208	455.1	54,383	8,417
Bear Creek	8,319	2,902	186.7	28,275	14,573
Evans Creek	1,333	225	492.4	2,746	1,614
Applegate River	10,659	4,239	151.5	17,335	13,012
Illinois River	4,961	2,804	76.9	8,705	6,323
Other tributaries of Rogue River	3,335	1,984	68.1	5,521	4,204
Klamath River and tributaries	153,105	80,433	90.4	362,793	205,374
Klamath River direct	65,720	52,814	24.4	128,763	76,075
Lost River	58,568	1,180	.....	194,748	95,304
Sprague River	7,800	3,690	111.4	10,150	9,980
Other tributaries of Klamath River	21,017	[2] 22,749	−7.6	29,132	24,015
Russian River	3,045	314	869.7	12,475	4,200
Sacramento River and tributaries	640,950	206,312	210.7	1,204,769	804,605
Sacramento River direct	194,397	10,942	.....	439,169	296,748
Pit River	89,984	72,072	24.9	129,984	107,478
Cow Creek	6,068	2,321	161.4	12,488	7,446
Cottonwood Creek	2,972	1,858	60.0	21,016	4,112
Battle Creek	2,966	2,642	12.3	6,590	5,108
Stony Creek	23,559	4,110	473.2	45,143	36,191
Feather River	142,841	67,111	112.8	186,756	167,463
Yuba River	19,473	[3]	.....	69,074	23,492
Cache Creek	24,541	3,756	553.4	56,498	31,212
American River	47,156	10,112	366.3	82,695	52,842
Other tributaries of Sacramento River	86,993	[2] 31,388	177.2	155,356	132,513
San Joaquin River and tributaries	2,103,694	932,931	125.5	4,294,966	3,248,919
San Joaquin River direct	642,261	129,647	395.4	1,083,862	873,300
Kern River	200,641	116,189	72.7	432,481	299,665
Tulare Lake	70,134	[3]	.....	204,860	147,444
Tule River	61,223	[3]	.....	175,777	109,412
Kaweah River	149,932	[3]	.....	356,703	299,474
Kings River	552,601	596,091	−7.3	1,052,406	895,263
Fresno River	12,414	10,729	15.7	30,094	14,016
Merced River	65,151	19,636	231.8	222,715	71,709
Tuolumne River	165,533	[3]	.....	298,418	250,425
Stanislaus River	75,359	13,840	444.5	155,453	111,192
Calaveras River	13,323	[3]	.....	21,598	16,489
Mokelumne River	36,848	5,558	563.0	155,480	72,144
Cosumnes River	3,259	[3]	.....	9,011	6,405
Other tributaries of San Joaquin River	55,015	[2] 41,241	33.4	96,198	81,981
Tributaries of San Francisco Bay other than the Sacramento and San Joaquin Rivers	76,947	38,549	99.6	100,730	86,779
Coyote Creek	25,092	8,483	195.8	30,979	26,526
Guadalupe River	29,248	6,547	346.7	34,549	31,008
Other tributaries	22,607	23,519	−3.9	35,202	29,245
Pajaro River	19,771	14,157	39.7	33,620	25,769
Salinas River	48,097	10,604	353.6	60,989	57,456
Santa Maria River	9,623	1,544	523.3	22,903	20,460
Santa Ynez River	3,491	1,493	133.8	10,082	9,645
Santa Clara River	28,270	14,214	98.9	43,205	30,216
Los Angeles River	59,072	5,310	.....	82,657	73,606
San Gabriel River	127,146	33,766	276.6	161,737	145,022
Santa Ana River	185,508	70,492	163.2	281,030	218,735
San Diego River	8,812	5,130	71.8	14,039	10,789
Other Pacific Ocean streams	58,427	126,198	−53.7	147,934	91,258

[1] A minus sign (−) denotes decrease. Per cent not shown when base is less than 100 or when per cent is more than 1,000.
[2] Includes springs and wells.
[3] Not reported separately in 1902.

CAPITAL INVESTED AND COST OF OPERATION AND MAINTENANCE.

TABLE 8.—CAPITAL INVESTED IN IRRIGATION ENTERPRISES: 1890 TO 1920.

CENSUS YEAR.	Amount.	Per cent of increase.	AVERAGE PER ACRE.	
			Amount.	Per cent of increase.
1920	$697,657,328	117.0	$26.81	69.1
1910	321,454,008	359.2	15.85	75.3
1900	70,010,594	137.1	9.04	13.6
1890	29,533,921	.....	7.96	.....

TABLE 9.—CAPITAL INVESTED, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Amount.	Per cent of total.	Average per acre.
Total	$697,657,328	100.0	$26.81
Before 1860	9,527,597	1.4	26.72
1860–1869	24,130,038	3.5	16.84
1870–1879	37,722,304	5.4	11.16
1880–1889	76,427,344	11.0	15.63
1890–1899	77,443,017	11.1	21.75
1900–1904	95,749,105	13.7	32.31
1905–1909	183,980,169	26.4	43.22
1910–1914	102,507,009	14.7	41.67
1915–1919	67,613,693	9.7	34.41
Not reported	22,557,052	3.2	18.83

TABLE 10.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY SOURCE OF WATER SUPPLY.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920.			OPERATION AND MAINTENANCE, 1919.	
	Amount.	Per cent of total.	Average per acre.	Area for which cost is reported (acres).	Average cost per acre.[1]
Total	$697,657,328	100.0	$26.81	16,260,750	$2.43
Streams, gravity	439,570,623	63.0	22.81	12,190,697	1.25
Streams, pumped	59,343,298	8.5	28.01	1,151,313	6.50
Streams, pumped and gravity	9,512,907	1.4	40.02	198,656	2.33
Wells, pumped	76,787,251	11.0	45.85	1,064,338	10.07
Wells, flowing	2,945,059	0.4	36.92	27,543	2.77
Wells, flowing and pumped	2,498,672	0.4	58.51	29,600	8.04
Lakes, pumped	2,274,601	0.3	38.06	45,558	5.20
Lakes, gravity	2,906,612	0.4	19.46	78,586	1.30
Springs	5,793,988	0.8	23.01	139,244	1.63
Stored storm water	15,075,592	2.2	67.47	87,666	2.30
City water	219,783	[2]	156.88	361	20.73
Sewage	174,444	[2]	52.85	1,631	9.05
Streams, gravity, and pumped wells	28,347,835	4.1	72.73	315,640	5.97
Streams, gravity, and flowing wells	2,863,194	0.4	27.38	79,354	1.30
Other mixed	48,467,251	6.9	34.67	838,622	2.71
Other and not reported	876,218	0.1	54.86	11,941	10.75

[1] Based on area irrigated in 1919.
[2] Less than one-tenth of 1 per cent.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902.

DRAINAGE BASIN.	1920	1902	INCREASE.[1]	
			Amount.	Per cent.
Total	$697,657,328	$82,531,665	$615,125,663	745.3
Missouri River and tributaries.	131,553,106	16,176,277	115,376,829	713.2
Missouri River direct	2,300,975	121,537	2,179,438	.....
Jefferson River and tributaries	5,370,454	760,328	4,610,126	606.3
Jefferson River direct	587,388	115,995	471,393	406.4
Beaverhead River	1,723,746	255,779	1,467,967	573.9
Big Hole River	1,669,767	135,609	1,534,158	.....
Boulder River	149,655	43,510	106,145	244.0
Passamari River	559,000	122,638	436,342	355.7
Other tributaries of Jefferson River	680,898	[2] 86,777	594,121	684.7
Madison River	460,823	92,986	367,837	395.6
Gallatin River	977,786	454,845	522,941	115.0
Smith River	190,836	64,777	126,059	194.6
Sun River	4,709,303	173,399	4,535,904	.....
Teton River	1,251,130	111,990	1,139,140	.....
Marias River	5,502,770	142,443	5,360,327	.....
Judith River	281,842	124,513	157,329	126.4
Musselshell River	986,755	285,868	700,887	245.2
Milk River and tributaries	7,271,098	263,698	7,007,400	.....
Milk River direct	154,208	119,200	35,008	29.4
Sage Creek	2,400,248	16,127	2,384,121	.....
Snake River	8,600	9,935	−1,335	−13.4
Other tributaries of Milk River	4,708,042	[2] 118,436	4,589,606	.....
Yellowstone River and tributaries	30,181,550	2,770,235	27,411,315	989.5
Yellowstone River direct	7,508,390	303,888	7,204,502	.....
Clark Fork and tributaries	1,225,483	335,777	889,706	265.0
Clark Fork direct	1,163,593	321,452	842,141	262.0
Tributaries of Clark Fork	61,890	14,325	47,565	332.0
Shields River	424,103	109,074	315,029	288.8
Stillwater River	298,570	51,502	247,068	479.7
Big Horn River and tributaries	16,670,257	922,858	15,747,399	.....
Big Horn River direct	3,635,033	25,425	3,609,608	.....
Popo Agie River	349,546	72,264	277,282	383.7
Wind River	2,101,819	17,904	2,083,915	.....
Poison Creek	1,000	18,700	−17,700	−94.7
Owl Creek	52,915	40,154	12,761	31.8
No Wood River	161,588	81,978	79,610	97.1
Greybull River	503,184	204,604	298,580	145.9
Shell Creek	380,420	32,730	347,690	.....
Shoshone River	8,702,480	378,278	8,324,202	.....
Little Horn River	35,000	31,695	3,305	10.4
Other tributaries of Big Horn River	747,272	[2] 19,126	728,146	.....
Missouri River, etc.—Con.				
Yellowstone River, etc.—Con.				
Rosebud River	$9,303	$61,708	−$52,405	−84.9
Tongue River and tributaries	1,419,629	430,275	989,354	229.9
Tongue River direct	734,059	262,620	471,439	179.5
Goose Creek	563,518	127,100	436,418	343.4
Other tributaries of Tongue River	122,052	[2] 40,555	81,497	201.0
Powder River and tributaries	1,195,398	297,584	897,814	301.7
Powder River direct	187,502	12,500	175,002	.....
Red Fork Creek	78,500	12,800	65,700	513.3
Crazy Woman Creek	127,701	22,275	105,516	473.7
Clear Creek	553,465	189,375	364,090	192.3
Other tributaries of Powder River	248,140	[2] 60,634	187,506	309.2
Other tributaries of Yellowstone River	1,430,417	[2] 257,569	1,172,848	455.4
Little Missouri River	71,608	[2] 38,437	33,171	86.3
Moreau River	40,927	3,731	37,196	996.9
Cheyenne River and tributaries	5,005,911	447,624	5,158,287	.....
Cheyenne River direct	5,277,782	325,657	4,952,125	.....
North Fork (Belle Fourche)	76,066	50,165	25,901	51.6
South Fork and tributaries	252,063	68,362	183,701	268.7
South Fork direct	166,820	49,272	117,548	238.6
Hat Creek	85,243	[2] 19,090	66,153	346.5
Other tributaries of Cheyenne River	.....	[2] 3,440	−3,440	−100.0
White River	183,349	[2] 155,924	27,425	17.6
Niobrara River	360,439	[2] 77,100	283,339	367.5
Platte River and tributaries	62,893,983	9,241,861	53,652,122	580.5
Platte River direct	488,642	565,470	−76,828	−13.6
North Platte River and tributaries	25,702,212	3,337,627	22,364,585	670.1
North Platte River direct	17,624,060	[3] 1,197,959	16,426,101	.....
Beaver Creek	37,497	51,168	−13,671	−26.7
Grand Encampment Creek	72,692	50,828	21,864	43.0
Spring Creek	184,290	38,496	145,794	378.7
Sage Creek	4,206	13,790	−9,584	−69.5
Pass Creek	50,051	41,877	8,174	19.5
Medicine Bow River	346,664	244,287	102,377	41.9
Sweetwater River	87,322	54,701	32,621	59.6
Muddy Creek	7,770	6,546	1,224	18.7
Box Elder Creek	104,676	37,655	67,021	178.0
La Prele Creek	327,411	37,500	289,911	773.1
Laborite Creek	71,826	32,640	39,186	120.1

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.
[3] Includes $143,300 in Colorado for which main stream was not reported.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902—Continued.

DRAINAGE BASIN.	1920	1902	INCREASE.[1] Amount.	INCREASE.[1] Per cent.
Missouri River, etc.—Con.				
Platte River, etc.—Con.				
North Platte River, etc.—Con.				
Laramie River and tributaries	$4,386,696	$888,096	$3,498,600	393.9
Laramie River direct	974,841	661,206	313,635	47.4
Little Laramie River	48,753	119,122	−70,369	−59.1
Sybille Creek	65,041	32,200	32,841	102.0
North Laramie River	396,708	13,886	382,822	.....
Chugwater Creek	83,155	30,945	52,210	168.7
Other tributaries of Laramie River	2,818,198	[2] 30,737	2,787,461	.....
Rawhide Creek	27,330	49,445	−22,115	−44.7
Horse Creek	536,475	132,847	403,628	303.8
Blue River	31,050	22,620	8,430	37.3
Pumpkin Creek	92,060	19,925	72,135	362.0
Other tributaries of North Platte River	1,710,136	[2] 273,947	1,436,189	524.3
South Platte River and tributaries	36,676,829	4,990,435	31,686,394	634.9
South Platte River direct	9,199,612	2,057,210	7,142,402	347.2
Bear Creek	137,240	76,635	60,605	79.1
Clear Creek	862,209	404,775	457,434	113.0
St. Vrain Creek	9,298,122	398,650	8,899,472	.....
Big Thompson Creek	1,102,316	600,166	502,150	83.7
Cache la Poudre River	7,946,409	1,067,354	6,879,055	644.5
Lone Tree Creek	2,767,273	17,380	2,749,893	.....
Crow Creek	100,619	43,925	56,694	129.1
Big Beaver Creek	52,600	98,000	−45,400	−46.3
Lodgepole Creek	445,738	87,140	358,598	411.5
Other tributaries of South Platte River	4,764,691	[2] 139,200	4,625,491	.....
Loup River	21,300	320,615	−299,315	−93.4
Other tributaries of Platte River	5,000	[2] 27,714	−22,714	−82.0
Kansas River and tributaries	537,605	437,209	100,396	23.0
Republican River	500,285	404,917	95,368	23.6
Smoky Hill River	34,953	3,410	31,543	925.0
Big Blue River	1,625	[3]	1,625	.....
Other tributaries of Kansas River	742	28,882	−28,140	−97.4
Other tributaries of Missouri River	2,373,962	407,772	1,966,190	482.2
Mississippi River and tributaries, exclusive of Missouri River	35,183,789	4,619,814	30,563,975	661.6
Mississippi River direct	302,385	[3]	302,385	.....
Arkansas River and tributaries	30,241,390	4,586,655	25,654,735	559.3
Arkansas River direct	15,092,972	3,320,325	11,772,647	354.6
South Fork	69,000	24,785	44,215	178.4
Fountain River	965,287	106,240	859,047	808.6
St. Charles River	241,884	22,060	219,824	996.5
Huerfano River	3,204,519	72,690	3,131,829	.....
Apishapa River	1,190,695	4,970	1,185,725	.....
Purgatoire or Las Animas River and tributaries	494,963	152,423	342,540	224.7
Purgatoire or Las Animas River direct	491,450	151,413	340,037	224.6
Trinchera River	3,513	1,010	2,503	247.8
Canadian River and tributaries	5,155,486	435,860	4,719,626	.....
Canadian River direct	148,331	22,108	126,223	570.9
Cimarron River	2,188,908	130,580	2,058,328	.....
Vermejo River	1,248,537	131,020	1,117,517	852.9
Ocate Creek	319,529	9,400	310,129	.....
Mora River	262,575	99,475	163,100	164.0
Ute Creek	7,000	10,000	−3,000	−30.0
Other tributaries of Canadian River	980,606	[2] 33,277	947,329	.....
Cimarron River	416,304	83,277	333,027	399.9
Other tributaries of Arkansas River	3,410,280	[2] 364,025	3,046,255	836.8
St. Francis River	218,727	[3]	218,727	.....
White River	3,992,967	[3]	3,992,967	.....
Ouachita River	1,100	[3]	1,100	.....
Red River and tributaries	398,534	3,218	395,316	.....
Other tributaries of Mississippi River	28,686	[2] 29,941	−1,255	−4.2
Gulf streams other than Mississipp iRiver and Rio Grande	29,439,808	501,272	28,938,536	.....
Atchafalaya River and tributaries	407,956	[3]	407,956	.....
Vermilion River and tributaries	3,355,327	[3]	3,355,327	.....
Mermentau River and tributaries	7,713,797	[3]	7,713,797	.....
Calcasieu Lake and River and tributaries	1,816,380	[3]	1,816,380	.....
Sabine River and tributaries	673,935	[3]	673,935	.....
Neches River	1,596,770	[3]	1,596,770	.....
Trinity River	1,743,621	[3]	1,743,621	.....
Brazos River	569,543	25,443	544,100	.....
Colorado River	3,560,916	154,529	3,406,387	.....
San Antonio River	5,087,542	63,765	5,023,777	.....
Nueces River	1,326,555	56,808	1,269,747	.....
Other Gulf streams	1,587,466	200,727	1,386,739	690.9
Rio Grande and tributaries	$34,172,940	$6,367,065	$27,805,875	436.7
Rio Grande direct	21,340,536	2,481,393	18,859,143	760.0
Saguache River	103,048	16,165	86,883	537.5
San Luis River	184,312	4,220	180,092	.....
Alamosa River	556,909	27,080	529,829	.....
La Jara River	30,275	[3]	30,275	.....
Conejos River	564,739	68,242	496,497	727.6
Trinchera River	659,890	23,650	636,240	.....
Rio Costilla	11,471	4,697	6,774	144.2
Pueblo River	19,982	11,560	8,422	72.9
Rio Chama	141,891	29,849	112,042	375.4
Rio Santa Cruz	18,281	12,862	5,419	42.1
Tesuque Creek	16,864	22,680	−5,816	−25.6
Rio Puerco	88,109	53,523	34,586	64.6
Pecos River and tributaries	7,483,049	3,185,855	4,297,194	134.9
Pecos River direct	5,514,099	2,735,221	2,778,878	101.6
Gallinas River	519,566	30,931	488,635	.....
Hondo River	578,094	261,863	316,231	120.8
Penasco River	222,693	50,363	172,330	342.2
Other tributaries of Pecos River	648,597	[2] 107,477	541,120	503.5
Las Moras Creek	192,566	7,925	184,641	.....
Other tributaries of Rio Grande	2,761,018	[2] 417,364	2,343,654	561.5
Independent streams in Rio Grande drainage basin	651,171	126,550	524,621	414.6
Rio Mimbres	318,062	[2] 112,192	205,870	183.5
Fresno River	297,724	2,440	295,284	.....
Rio Tularosa	33,900	5,868	28,032	477.7
Other independent streams	1,485	[2] 6,050	−4,565	−75.5
Colorado River and tributaries	86,696,940	11,298,671	75,398,269	601.8
Colorado River direct	22,214,932	753,973	21,460,959	.....
Green River and tributaries	8,592,346	1,470,459	7,121,887	484.3
Green River direct	547,166	57,900	489,266	845.0
New Fork	293,043	27,253	265,790	975.3
Horse Creek	51,163	13,350	37,813	283.2
Cottonwood Creek	456,827	11,000	445,827	.....
South Piney Creek	85,728	38,761	46,967	121.2
La Barge Creek	39,150	20,365	18,785	92.2
Fontenelle Creek	33,000	9,777	23,223	237.5
Bitter Creek	93,158	4,500	88,658	.....
Blacks Creek	566,776	68,296	498,480	729.9
Henrys Fork	77,320	11,291	66,029	584.8
Ashley Fork River	374,140	57,835	316,305	546.9
Duchesne River	2,428,174	[3]	2,428,174	.....
Price River	458,725	41,719	417,006	999.6
San Rafael River	288,100	295,850	−7,750	−2.6
Yampa River and tributaries	1,197,975	[4] 569,892	628,083	110.2
Yampa River direct	162,768	[3]	162,768	.....
Little Snake River	511,556	325,107	186,449	57.4
Other tributaries of Yampa River	523,651	[3]	523,651	.....
White River	447,141	137,005	310,136	226.4
Other tributaries of Green River	1,154,760	[2] 105,665	1,049,095	992.9
Grand River and tributaries	24,501,211	3,561,457	20,939,754	588.0
Grand River direct	6,142,951	491,710	5,651,241	.....
Fraser River	55,860	5,235	50,625	967.0
Muddy Creek	33,122	8,650	24,472	282.9
Blue River	116,608	21,359	95,249	445.9
Eagle River	109,012	75,570	33,442	44.3
Roaring Fork	407,266	163,170	244,096	149.6
Plateau Creek	341,755	60,035	281,720	469.3
Gunnison River and tributaries	10,745,767	1,351,906	9,393,861	694.9
Gunnison River direct	1,001,819	55,380	946,439	.....
Taylor River	6,900	64,985	−58,085	−89.4
Tomichi Creek	120,243	28,350	100,893	355.9
North Fork Creek	622,647	272,705	349,942	128.3
Smith Fork River	396,075	21,600	374,475	.....
Uncompahgre River	6,945,702	643,121	6,302,581	980.0
Other tributaries of Gunnison River	1,643,381	[2] 265,765	1,377,616	518.4
Rio Dolores	4,847,569	1,156,793	3,690,776	319.1
Other tributaries of Grand River	1,701,301	[2] 227,029	1,474,272	649.4
Fremont River	567,050	189,380	377,670	199.4
Virgin River	1,622,997	171,355	1,451,642	847.2
San Juan River and tributaries	3,088,495	534,288	2,554,207	478.1
San Juan River direct	1,039,358	179,919	859,439	477.7
Mancos River	35,477	14,910	20,567	137.9
Los Pinos River	524,590	84,580	440,010	520.2
Animas River	1,148,088	157,305	990,783	629.8
La Plata River	142,588	61,329	81,259	132.5
Other tributaries of San Juan River	198,394	36,245	162,149	447.4
Kanab Wash	20,500	4,700	15,800	336.2
Williams River	55,504	15,636	39,868	255.0
Little Colorado River and tributaries	460,206	265,701	194,505	73.2
Little Colorado River direct	146,913	218,900	−71,987	−32.9
Nutrioso Creek	16,500	2,600	13,900	534.6
Concho Creek	49,228	850	48,378	.....
Other tributaries of Little Colorado River	247,565	[2] 43,351	204,214	471.1

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.
[3] Not reported separately in 1902.
[4] Includes $244,785 in Colorado for which main stream was not reported.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902—Continued.

DRAINAGE BASIN.	1920	1902	INCREASE.[1] Amount.	INCREASE.[1] Per cent.
Colorado River, etc.—Con.				
Gila River and tributaries	$25,236,237	$4,205,619	$21,030,618	500.1
Gila River direct	2,888,708	1,249,896	1,638,812	131.1
San Francisco River	25,224	35,040	−9,816	−28.0
San Pedro River	359,153	40,135	319,018	794.9
Santa Cruz River	5,168,524	79,686	5,088,838	.....
Salt River and tributaries	14,939,034	2,697,189	12,241,845	453.9
Salt River direct	14,339,874	2,404,160	11,935,714	496.5
Tonto Creek	9,468	15,085	−5,617	−37.2
Rio Verde	209,482	250,813	−41,331	−16.5
Other tributaries of Salt River	380,210	[2] 27,131	353,079	.....
Agua Fria River	1,428,077	20,998	1,407,079	.....
Hassayampa River	51,299	11,160	40,139	359.7
Other tributaries of Gila River	376,218	[2] 71,515	304,703	426.1
Other tributaries of Colorado River	337,462	[2] 126,103	211,359	167.6
Whitewater Draw and tributaries	299,368	6,735	292,633	.....
Great Basin Drainage	73,992,828	10,890,199	63,102,629	579.4
Tributaries of Great Salt Lake	18,109,805	5,640,308	12,469,497	221.1
Bear River and tributaries	7,438,075	3,020,489	4,417,586	146.3
Bear River direct	4,512,182	2,247,689	2,264,493	100.7
Little Bear River	720,363	163,170	557,193	341.5
Malad River	18,097	[3]	18,097	.....
Thomas Fork	25,389	16,210	9,179	56.6
Mill Creek	21,012	18,640	2,372	12.7
Little Malad Creek	332,175	30,945	301,230	973.4
Other tributaries of Bear River	1,808,857	543,835	1,265,022	232.6
Weber River and tributaries	2,106,048	796,837	1,309,211	164.3
Weber River direct	1,353,323	549,432	803,891	146.3
Ogden River	423,755	168,406	255,349	151.6
East Canyon Creek	74,010	22,890	51,120	223.3
Other tributaries of Weber River	254,960	56,109	198,851	354.4
Jordan River and Utah Lake and tributaries	8,565,682	1,822,982	6,742,700	369.9
Jordan River direct	746,836	753,100	−6,264	−0.8
Spanish Fork River	4,126,999	123,930	4,003,069	.....
Hobble Creek	41,024	32,588	8,436	25.9
Provo River	985,979	328,691	657,288	200.0
American Fork River	302,449	162,130	140,319	86.5
Little Cottonwood Creek	226,221	25,825	200,396	776.0
Big Cottonwood Creek	315,563	45,590	269,973	592.2
Other tributaries of Jordan River and Utah Lake	1,820,611	351,128	1,469,483	418.5
Independent streams	48,479,571	5,249,891	43,229,680	823.5
Sevier River and tributaries	9,509,836	808,872	8,700,964	.....
Sevier River direct	7,002,349	443,032	6,559,317	.....
San Pitch River	1,142,510	228,536	913,974	399.9
Otter Creek	151,850	18,355	133,495	727.3
South Fork	372,626	15,650	356,976	.....
Other tributaries of Sevier River	840,501	103,299	737,202	713.7
Beaver River	842,305	65,325	776,980	.....
Coal Creek	179,171	7,076	172,095	.....
Deep Creek (Utah)	8,844	6,692	2,152	32.2
Grouse Creek	28,338	2,850	25,488	894.3
Humboldt River and tributaries	1,751,566	763,110	988,456	129.5
Humboldt River direct	739,995	486,730	253,265	52.0
East Fork of Humboldt River	202,071	7,610	194,461	.....
La Moille Creek	91,280	14,840	76,440	515.1
North Fork of Humboldt River	57,403	10,045	47,358	471.5
South Fork of Humboldt River	288,162	53,870	234,292	434.9
Pine Creek	2,809	2,450	359	14.7
Reese River	79,120	36,815	42,305	114.9
Little Humboldt River	2,544	53,580	−51,036	−95.3
Other tributaries of Humboldt River	288,182	97,170	191,012	196.6
Truckee River and tributaries	594,187	296,435	297,752	100.4
Truckee River direct	485,900	253,470	232,430	91.7
Steamboat Creek	42,070	39,670	2,400	6.0
Other tributaries of Truckee River	66,217	3,295	62,922	.....
Carson River and tributaries	8,064,685	165,642	7,899,043	.....
Carson River direct	164,395	147,157	17,238	11.7
Other tributaries of Carson River	7,900,290	18,485	7,881,805	.....
Walker River and tributaries	1,699,059	376,440	1,322,619	351.3
Walker River direct	1,680,651	375,790	1,304,861	347.2
Other tributaries of Walker River	18,408	650	17,758	.....
Duck Creek	252,851	10,700	242,151	.....
Steptoe Creek	189,986	19,940	170,046	852.8
Long Valley Creek	171,642	16,345	155,297	950.1
Mono Lake and tributaries	5,363,858	15,200	5,348,658	.....
Susan River	242,426	203,205	39,221	19.3
Mohave River	616,769	114,800	501,969	437.3
Owens River	5,785,132	408,875	5,376,257	.....
San Jacinto River	2,139,257	775,000	1,364,257	176.0
Great Basin Drainage—Con.				
Independent streams—Con.				
Whitewater River	$2,242,944	[3]	$2,242,944	.....
Quinn River	50,548	$61,100	−10,552	−17.3
Deep Creek (Oregon)	6,829	6,100	729	12.0
Donner and Blitzen River	131,750	35,400	96,350	272.2
Silver Creek	26,016	21,845	4,171	19.1
Silvies River	1,005,862	74,310	931,552	.....
Thomas Creek	6,506	5,360	1,146	21.4
Other independent streams	7,569,204	989,269	6,579,935	.....
Columbia River and tributaries	145,672,382	10,851,415	134,820,967	.....
Columbia River direct	2,240,216	8,700	2,231,516	.....
Kootenai River	221,976	13,539	208,437	.....
Clark Fork and tributaries	8,421,384	1,308,486	7,112,898	543.6
Clark Fork direct	209,549	64,591	144,958	224.4
Missoula River and tributaries	3,474,524	1,243,895	2,230,629	179.3
Missoula River direct	159,771	27,367	132,404	483.8
Hellgate River	1,349,403	392,065	957,338	244.2
Big Blackfoot River	624,291	114,450	509,841	445.5
Bitter Root River	1,138,329	674,130	464,199	68.9
Other tributaries of Missoula River	202,730	35,883	166,847	465.0
Flathead River	4,737,311	[3]	4,737,311	.....
Colville River	486,747	938	485,809	.....
Spokane River and tributaries	2,214,417	2,994	2,211,423	.....
Spokane River direct	1,637,743	2,994	1,634,749	.....
Coeur d'Alene Lake and River	576,674	[3]	576,674	.....
Okanogan River and tributaries	2,259,018	12,374	2,246,644	.....
Okanogan River direct	227,290	360	226,930	.....
Salmon Creek	1,069,972	5,085	1,064,887	.....
Other tributaries of Okanogan River	961,756	6,929	954,827	.....
Methow River	483,809	20,825	462,984	.....
Entiat River	73,889	17,150	56,739	330.8
Wenatchee River	1,868,541	95,755	1,772,786	.....
Crab Creek	859,050	5,415	853,635	.....
Yakima River and tributaries	14,849,689	1,968,555	12,881,134	654.3
Yakima River direct	13,912,727	1,580,195	12,332,532	780.4
Wilson Creek	45,875	17,925	27,950	155.9
Naches River	458,027	276,223	181,804	65.8
Ahtanum River	88,443	14,950	73,493	491.6
Other tributaries of Yakima River	344,617	79,262	265,355	334.8
Snake River and tributaries	93,625,117	6,749,247	86,875,870	.....
Snake River direct	37,728,943	578,000	37,150,343	.....
Gros Ventre River	31,225	14,802	16,423	111.0
Little Gros Ventre River	18,746	13,330	5,416	40.6
Salt River	149,207	41,724	107,483	257.6
Pierre River and tributaries	.....	12,595	−12,595	−100.0
Henrys Fork	2,001,841	428,430	1,573,411	367.3
South Fork of Snake River	6,193,701	633,698	5,560,003	877.4
Blackfoot River	1,022,276	43,690	978,586	.....
Port Neuf River	1,141,528	58,255	1,083,273	.....
Raft River	100,928	46,635	54,293	116.4
Goose Creek	393,755	3,000	390,755	.....
Salmon Falls River	4,152,745	[3]	4,152,745	.....
Little Wood River	1,016,699	[3]	1,016,699	.....
Big Wood River	5,395,133	239,228	5,155,905	.....
Bruneau River	574,955	238,140	336,815	141.4
Owyhee River	1,411,424	206,881	1,204,543	582.2
Boise River	16,013,734	1,674,583	14,339,151	856.3
Malheur River	2,027,683	282,808	1,744,785	616.8
Payette River	2,915,780	685,232	2,230,548	325.5
Weiser River	2,018,450	116,601	1,901,849	.....
Burnt River	639,491	65,601	573,800	873.5
Powder River	1,552,987	268,101	1,284,886	479.3
Pine Creek	97,522	36,595	60,927	166.5
Imnaha River	206,378	10,885	195,493	.....
Salmon River	1,175,362	227,508	947,854	416.6
Grande Ronde River	476,998	82,011	394,987	481.6
Clearwater River	298,755	90,585	208,170	229.8
Asotin Creek	606,084	94,100	511,984	544.1
Pataha River	47,085	1,905	45,180	.....
Palouse River	175,100	2,810	172,290	.....
Other tributaries of Snake River	4,040,602	550,734	3,489,868	633.7
Independent streams in Snake River Basin	3,828,606	151,160	3,677,446	.....
Camas Creek	578,627	6,263	572,364	.....
Beaver Creek	7,259	4,290	2,969	69.2
Medicine Lodge	31,690	3,800	27,890	733.9
Little Lost River	474,465	32,710	441,755	.....
Big Lost River	2,709,698	79,717	2,629,981	.....
Other independent streams	26,867	24,380	2,487	10.2
Walla Walla River	1,171,914	31,907	1,140,007	.....
Klickitat River	64,423	1,882	62,541	.....
White Salmon River	91,786	6,700	85,086	.....
Umatilla River	4,308,892	61,430	4,247,462	.....
Willow Creek	60,139	20,375	39,764	195.2
John Day River	510,248	120,060	390,188	325.0
Deschutes River	5,078,636	138,755	4,939,881	.....
Hood River	807,269	54,000	753,269	.....
Willamette River	100,561	3,240	97,321	.....
Other tributaries of Columbia River	2,046,055	57,928	1,988,127	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Includes springs and wells.
[3] Not reported separately in 1902.

TABLE 11.—CAPITAL INVESTED, CLASSIFIED BY DRAINAGE BASIN: 1920 AND 1902—Continued.

DRAINAGE BASIN.	1920	1902	INCREASE.[1] Amount.	INCREASE.[1] Per cent.
Pacific Ocean streams other than the Colorado and Columbia Rivers	$107,308,448	$21,603,667	$145,704,781	671.6
Dungeness River	94,010	8,000	86,010	.....
McDowell Creek	.....	2,000	−2,000	−100.0
Rogue River and tributaries	1,783,089	147,223	1,636,766	.....
Rogue River direct	165,665	7,540	158,125	.....
Little Butte Creek	604,794	10,490	594,304	.....
Bear Creek	615,878	20,895	594,983	.....
Evans Creek	40,836	2,675	38,161	.....
Applegate River	180,804	60,325	120,569	199.9
Illinois River	87,966	27,748	60,218	217.0
Other tributaries of Rogue River	87,956	17,550	70,406	401.2
Klamath River and tributaries	5,592,890	529,456	4,973,434	939.3
Klamath River direct	1,734,099	282,996	1,451,103	512.8
Lost River	3,451,383	17,550	3,433,833	.....
Sprague River	32,368	26,560	5,808	21.0
Other tributaries of Klamath River	285,040	202,350	82,690	40.9
Russian River	102,630	2,463	100,167	.....
Sacramento River and tributaries	28,833,106	1,882,227	26,950,879	.....
Sacramento River direct	11,830,374	49,368	11,781,006	.....
Pit River	799,913	274,671	525,242	191.2
Cow Creek	126,946	15,246	111,700	732.7
Cottonwood Creek	573,601	124,473	449,128	360.8
Battle Creek	95,130	34,796	60,343	173.4
Stony Creek	1,530,614	42,250	1,497,364	.....
Feather River	3,937,380	869,841	3,067,539	352.7
Yuba River	2,518,770	[3]	2,518,770	.....
Cache Creek	916,477	28,115	888,362	.....
American River	2,890,114	112,758	2,777,356	.....
Other tributaries of Sacramento River	3,604,778	330,709	3,274,069	990.0
Pacific Ocean streams other than the Colorado and Columbia Rivers—Continued.				
San Joaquin River and tributaries	$71,694,653	$9,103,242	$62,591,411	687.6
San Joaquin River direct	9,224,164	1,504,238	7,719,926	513.2
Kern River	17,573,637	796,340	16,777,297	.....
Tulare Lake	3,910,620	[2]	3,910,620	.....
Tule River	2,842,495	[2]	2,842,495	.....
Kaweah River	6,186,840	[2]	6,186,840	.....
Kings River	8,145,446	2,976,688	5,168,758	173.6
Fresno River	415,385	400,514	14,871	3.7
Merced River	3,812,235	1,542,834	2,269,401	147.1
Tuolumne River	7,173,802	[2]	7,173,802	.....
Stanislaus River	7,840,486	968,964	6,871,522	709.2
Calaveras River	818,995	[2]	818,995	.....
Mokelumne River	1,675,137	305,239	1,369,898	448.8
Cosumnes River	153,899	[2]	153,899	.....
Other tributaries of San Joaquin River	1,921,512	[3] 608,425	1,313,087	215.8
Tributaries of San Francisco Bay other than Sacramento and San Joaquin Rivers	4,940,061	487,451	4,452,610	913.4
Coyote Creek	1,453,138	43,345	1,409,793	.....
Guadalupe River	1,883,049	75,795	1,807,254	.....
Other tributaries	1,603,874	[3] 368,311	1,235,563	335.5
Pajaro River	1,248,343	168,503	1,079,750	640.4
Salinas River	2,570,331	101,960	2,468,371	.....
Santa Maria River	573,194	32,380	540,814	.....
Santa Ynez River	284,037	33,745	250,292	741.7
Santa Clara River	2,211,473	374,151	1,837,322	491.1
Los Angeles River	5,508,400	309,611	5,198,789	.....
San Gabriel River	12,862,319	772,597	12,089,722	.....
Santa Ana River	19,918,550	1,919,531	17,999,019	937.7
San Diego River	1,780,124	32,100	1,757,024	.....
Other Pacific Ocean streams	7,421,338	5,786,937	1,634,401	28.2

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000. [2] Not reported separately in 1902. [3] Includes springs and wells.

In classifying capital invested by type of enterprise (Table 12) the average capital invested per acre is not presented, for the reason that it is not possible to compute this correctly from census data. The United States Reclamation Service supplies stored water to enterprises controlled by agencies of most of the other classes shown in the table and a part of its expenditure is properly chargeable to those lands, but it is not possible to tell how much should be so charged or how it should be distributed among the various classes, since the area to which water is supplied varies from season to season.

TABLE 12.—CAPITAL INVESTED, 1920, AND COST OF OPERATION AND MAINTENANCE, 1919, CLASSIFIED BY CHARACTER OF ENTERPRISE.

[When water is pumped, cost of operation and maintenance includes cost of fuel and attendance.]

CLASS.	CAPITAL INVESTED, 1920. Amount.	CAPITAL INVESTED, 1920. Per cent of total.	OPERATION AND MAINTENANCE, 1919. Area for which cost is reported (acres).	OPERATION AND MAINTENANCE, 1919. Average cost per acre.[1]
Total	$697,657,328	100.0	16,260,750	$2.43
Individual and partnership	154,634,109	22.2	5,133,421	3.02
Cooperative	183,041,500	26.2	5,754,232	1.67
Irrigation district	88,573,514	12.7	1,701,231	2.59
Carey Act	32,080,695	4.7	497,611	1.34
Commercial	85,735,470	12.3	1,779,595	3.48
U. S. Reclamation Service	$120,509,819	18.6	1,098,573	$2.20
U. S. Indian Service	14,851,236	2.1	254,378	1.80
State	344,174	[2]	1,608	4.86
City	2,936,678	0.4	33,507	3.85
Other	5,310,399	0.8	6,594	3.14
Not reported	30,674	[2]	.....	.....

[1] Based on area irrigated in 1919. [2] Less than one-tenth of 1 per cent.

DRAINAGE OF IRRIGATED LAND.

The acreages reported in Table 13 relate to lands within the boundaries of irrigation projects, and do not include lands within the vicinity of these projects. "Additional acreage needing drainage" includes all lands so reported by the owners of the enterprises, and includes lands producing partial crops as well as those wholly unproductive. Data for the several states are given in County Table I at the end of this summary.

TABLE 13.—ACREAGE WITHIN IRRIGATION ENTERPRISES FOR WHICH DRAINS HAVE BEEN INSTALLED AND ADDITIONAL ACREAGE IN NEED OF DRAINAGE.

Number of enterprises reporting land drained or needing drainage	3,068
Acreage included in enterprises reporting land drained or needing drainage	8,860,760
Acreage for which drains have been installed	1,519,853
Additional acreage needing drainage	1,476,771
Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	17.2
Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises	4.2
Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises	8.3

QUANTITY OF WATER USED.

The quantity of water used in 1919 was reported on only part of the irrigation schedules, and the figures given vary greatly. In order that proper values may be assigned to the figures given, those representing measurements and those representing estimates are reported separately in Table 14. Although the data are incomplete, the reports represent sufficient acreages to serve as bases for reliable averages.

TABLE 14.—QUANTITY OF WATER USED IN 1919.

ITEM.	Total.	Measured.	Not measured.
Average volume of water entering canals.....second-feet..	234,020	109,714	124,306
Area irrigated in 1919.....acres..	9,645,331	6,560,188	3,085,143
Average number of acres per second-foot..	41	60	25
Total quantity of water entering canals..... acre feet..	60,005,556	36,626,781	23,378,775
Area irrigated in 1919.....acres..	10,879,174	7,771,979	3,107,195
Average quantity per acre.....acre-feet..	5.5	4.7	7.5
Total quantity of water delivered.acre-feet..	15,339,104	8,673,241	6,665,763
Area irrigated in 1919.....acres..	6,059,953	3,980,026	2,079,927
Average quantity per acre.....acre-feet..	2.5	2.2	3.2

IRRIGATION WORKS.

TABLE 15.—IRRIGATION WORKS, CLASSIFIED BY DATE OF BEGINNING.

DATE OF BEGINNING.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	23,894	3,931	51,621	631,079	103,177	57,553	56,687	7,538	21,246,436
Before 1860	603	102	846	9,539	3,296	1,313	1,454	156	113,700
1860–1869	2,044	158	3,400	31,956	7,031	3,297	3,013	136	259,163
1870–1879	3,124	203	5,737	70,068	11,782	5,615	6,367	298	422,100
1880–1889	5,796	662	11,033	130,074	21,873	9,277	7,825	653	1,095,135
1890–1899	3,578	507	7,523	89,970	15,902	11,317	7,664	672	671,008
1900–1904	2,054	438	4,638	84,723	9,741	4,040	6,744	641	3,929,010
1905–1909	2,018	592	4,264	101,767	10,976	8,691	12,334	1,048	8,232,276
1910–1914	1,662	587	5,288	48,342	9,198	5,958	6,536	1,568	5,174,285
1915–1919	1,549	481	4,887	42,202	6,680	5,407	3,550	1,495	1,266,014
Not reported	1,466	201	4,005	22,438	6,698	2,638	1,200	871	83,145

DATE OF BEGINNING.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	8,878.3	4,606	935,057	32,094	16,396,549	29,458	748,971	33,804	36,275,005
Before 1860	88.0	26	3,292	37	19,028	46	684	55	28,073
1860–1869	79.1	58	4,309	79	38,909	43	574	44	43,439
1870–1879	285.9	127	32,240	82	46,174	83	3,697	108	86,287
1880–1889	825.2	498	38,439	327	144,829	290	14,938	407	1,476,530
1890–1899	674.4	340	51,819	846	400,373	668	37,387	862	4,378,623
1900–1904	504.7	490	100,628	1,591	745,045	1,455	59,286	1,741	3,706,532
1905–1909	1,340.6	763	216,806	3,304	1,741,309	2,898	98,729	3,492	4,379,501
1910–1914	2,334.5	741	220,667	10,467	5,436,719	9,468	226,748	10,867	8,316,741
1915–1919	2,136.3	629	135,326	10,971	5,861,661	10,469	242,629	11,713	10,663,654
Not reported	600.6	934	131,441	4,390	1,962,502	4,038	64,299	4,515	3,195,625

TABLE 16.—IRRIGATION WORKS, CLASSIFIED BY CHARACTER OF ENTERPRISE: 1920.

CLASS.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total	23,894	3,931	51,621	631,079	103,177	57,553	56,687	7,538	21,246,436
Individual and partnership	20,360	2,836	46,418	266,448	64,990	33,947	15,174	6,253	2,365,816
Cooperative	2,904	788	3,940	198,720	22,555	11,921	16,887	854	3,644,830
Irrigation district	252	80	457	51,847	4,907	2,502	6,150	86	1,682,577
Carey Act	47	20	69	18,812	1,471	550	2,574	31	893,956
Commercial	183	117	412	54,193	6,252	4,430	7,486	202	2,350,057
U. S. Reclamation Service	57	40	92	32,903	1,924	3,205	5,802	43	9,917,813
U. S. Indian Service	54	19	152	6,899	876	739	2,388	27	349,302
State	10	6	14	158	31	74	26	11	706
City	17	12	35	757	138	140	178	25	561
Other	10	4	32	342	33	45	22	6	34,828

CLASS.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.			
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horse-power).	Pumps.	
								Number.	Capacity (gallons per minute).
Total	8,878.3	4,606	935,057	32,094	16,396,549	29,458	748,971	33,804	36,275,005
Individual and partnership	4,795.2	3,964	826,570	30,415	14,953,276	28,336	537,381	31,564	22,563,649
Cooperative	2,091.1	255	62,021	1,082	1,014,138	752	82,963	1,252	3,515,742
Irrigation district	813.7	302	12,000	100	93,770	103	43,394	312	1,837,264
Carey Act	59.3	8	5,842	.....	.....	1	746	25	.....
Commercial	845.2	58	26,185	298	235,272	188	66,409	464	6,814,220
U. S. Reclamation Service	174.4	.....	.....	49	46,000	15	14,423	84	973,170
U. S. Indian Service	19.4	17	2,339	72	7,268	14	733	25	87,243
State	18.7	.....	.....	34	9,636	16	416	21	60,810
City	53.3	.....	.....	32	27,619	18	2,225	40	411,722
Other	8.0	2	100	12	9,570	15	281	17	11,185

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Total, states included	**23,894**	**3,931**	**51,621**	**631,079**	**103,177**	**57,553**	**56,687**	**7,538**	**21,246,436**
Missouri River and tributaries	**5,973**	**1,246**	**12,784**	**167,891**	**28,144**	**13,448**	**11,455**	**1,220**	**4,860,616**
Missouri River direct	45	22	106	1,617	517	236	148	22	871,819
Jefferson River and tributaries	1,174	45	2,106	25,319	3,422	3,468	890	59	165,003
Jefferson River direct	23	2	52	1,331	189	18	39	.....	.....
Beaverhead River	516	15	805	5,340	1,120	954	253	16	130,275
Big Hole River	442	8	726	7,171	1,132	2,231	480	10	6,171
Boulder River	48	3	105	649	185	33	2	3	11
Passamari River	54	7	184	1,456	298	101	61	18	19,076
Other tributaries of Jefferson River	91	10	234	9,372	498	81	55	12	8,870
Madison River	100	10	251	2,709	560	129	112	12	4,602
Gallatin River	88	5	410	4,243	885	146	228	2	1,200
Smith River	66	4	235	983	325	600	124	7	181
Sun River	91	14	109	2,467	313	166	199	16	854
Teton River	21	7	76	2,566	266	74	112	7	145,742
Marias River	38	15	76	2,634	227	260	719	15	22,926
Judith River	147	5	214	1,479	311	252	84	7	85
Musselshell River	192	35	443	4,277	866	806	280	16	34,479
Milk River and tributaries	201	104	301	7,416	692	895	554	94	146,041
Milk River direct	5	.....	7	200	31	9	2	1	16
Sage Creek	5	6	8	11	12	16	15	5	2,089
Snake River	13	6	17	72	23	86	38	4	158
Other tributaries of Milk River	178	92	269	7,133	626	784	499	84	143,778
Yellowstone River and tributaries	1,014	160	2,678	32,064	6,662	2,018	2,171	186	516,248
Yellowstone River direct	14	11	102	5,508	720	279	447	11	2,519
Clark Fork and tributaries	105	5	358	3,353	797	403	224	5	2,795
Clark Fork direct	101	5	304	3,177	719	399	223	1	91
Tributaries of Clark Fork	4	.....	54	176	78	4	1	4	2,704
Shields River	88	1	208	1,620	457	210	75	5	9,016
Stillwater River	5	.....	128	1,284	279	40	46	2	2
Big Horn River and tributaries	311	31	783	9,877	2,227	518	914	70	466,867
Big Horn River direct	55	2	78	2,387	341	60	265	1	2
Popo Agie River	37	.....	122	605	270	20	34	1	112
Wind River	7	1	88	1,005	233	12	13	2	2,050
Poison Creek	.....	.....	1	.....	.....	.....	.....	1	3
Owl Creek	6	.....	12	279	89	12	16	6	275
No Wood River	21	5	94	388	206	8	5	4	60
Greybull River	46	1	100	1,276	327	20	71	4	181
Shell Creek	31	5	53	433	145	10	20	5	1,637
Shoshone River	38	9	64	3,079	327	294	448	17	460,806
Little Horn River	2	.....	7	46	42	15	1	1	25
Other tributaries of Big Horn River	68	8	164	379	247	67	41	28	1,716
Rosebud River	11	2	17	73	21	6	.....	2	18
Tongue River and tributaries	183	37	260	2,508	582	191	126	36	11,377
Tongue River direct	43	12	82	1,333	231	126	35	9	150
Goose Creek	91	21	99	874	229	30	58	16	10,579
Other tributaries of Tongue River	49	4	79	301	122	35	33	11	648
Powder River and tributaries	152	32	258	2,620	679	90	125	25	4,112
Powder River direct	18	13	35	183	40	18	6	10	50
Red Fork Creek	19	.....	25	60	50	1	1	.....	.....
Crazy Woman Creek	17	2	49	525	113	18	10	4	37
Clear Creek	46	9	83	1,468	312	40	94	3	3,389
Other tributaries of Powder River	52	8	66	384	164	13	14	8	636
Other tributaries of Yellowstone River	145	41	564	5,221	900	281	214	30	19,542
Little Missouri River	21	24	46	160	51	59	26	33	3,796
Moreau River	3	55	29	33	24	26	4	19	2,262
Cheyenne River and tributaries	264	137	455	6,438	778	757	679	109	212,529
Cheyenne River direct	182	95	297	5,210	508	511	580	64	205,941
North Fork (Belle Fourche)	24	25	49	397	75	108	19	26	2,433
South Fork and tributaries	58	17	109	831	135	138	80	19	4,155
South Fork direct	47	15	69	806	91	137	79	13	4,046
Hat Creek	11	2	40	25	44	1	1	6	109
White River	63	23	81	237	131	104	66	17	1,302
Niobrara River	30	12	51	212	92	92	36	1	13,005
Platte River and tributaries	2,137	469	4,117	67,344	10,354	2,621	4,607	508	2,663,549
Platte River direct	4	1	26	1,776	207	36	137	1	1
North Platte River and tributaries	1,199	141	2,504	27,254	4,902	1,233	2,121	164	1,734,839
North Platte River direct	52	11	154	10,496	1,058	512	1,284	13	1,247,874
Beaver Creek	12	2	20	50	62	1	1	3	673
Grand Encampment Creek	13	1	31	106	52	7	7	1	150
Spring Creek	3	2	48	343	79	63	45	3	3,596
Sage Creek	2	.....	4	3	4	.....	.....	.....	.....
Pass Creek	3	.....	54	293	84	18	9	1	2,000
Medicine Bow River	112	13	283	927	414	68	58	9	7,459
Sweetwater River	42	1	85	174	141	37	20	9	2,474
Muddy Creek	1	.....	5	12	7	.....	.....	.....	.....
Box Elder Creek	13	3	33	44	68	5	16	3	36
La Prele Creek	11	3	47	326	81	13	62	2	20,012
Laborite Creek	40	.....	42	54	76	24	24	.....	.....

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Missouri River and tributaries—Continued.									
Platte River and tributaries—Continued.									
North Platte River and tributaries—Continued.									
Laramie River and tributaries	390	41	662	6,411	972	161	345	49	390,106
Laramie River direct	72	8	107	2,196	350	104	239	8	203,425
Little Laramie River	42	.....	98	435	141	26	15	.....	.....
Sybille Creek	98	11	122	297	119	4	3	10	260
North Laramie River	101	6	128	462	86	9	15	6	8,019
Chugwater Creek	37	10	100	152	107	10	.....	8	394
Other tributaries of Laramie River	40	6	107	2,869	169	8	73	17	124,008
Rawhide Creek	13	2	13	42	13	33	9	2	46
Horse Creek	46	26	121	774	169	32	41	26	27,335
Blue River	3	.....	5	139	27	.....	.....	.....	.....
Pumpkin Creek	13	7	43	209	71	44	23	.....	.....
Other tributaries of North Platte River	430	29	854	6,851	1,524	215	177	43	27,078
South Platte River and tributaries	930	321	1,578	38,215	5,226	1,347	2,343	338	927,789
South Platte River direct	106	14	207	13,272	1,298	381	484	22	421,292
Bear Creek	29	7	37	359	54	27	8	7	916
Clear Creek	81	5	60	1,806	177	65	94	12	6,767
St. Vrain Creek	171	83	195	5,600	1,649	219	356	69	123,395
Big Thompson Creek	33	23	42	2,810	241	64	146	20	44,617
Cache la Poudre River	107	92	267	8,382	653	313	1,016	96	237,585
Lone Tree Creek	16	5	39	62	15	1	.....	7	722
Crow Creek	14	13	59	220	55	13	9	16	4,673
Big Beaver Creek	4	1	8	226	27	1	.....	3	103
Lodgepole Creek	63	16	123	607	183	135	95	19	9,789
Other tributaries of South Platte River	306	62	541	4,871	874	128	135	67	77,930
Loup River	3	5	7	91	16	5	6	3	60
Other tributaries of Platte River	1	1	2	8	3	.....	.....	2	860
Kansas River and tributaries	58	18	87	1,333	224	116	70	9	197
Republican River	53	16	74	1,307	216	102	69	8	192
Smoky Hill River	5	2	10	20	7	14	1	1	5
Big Blue River	.....	.....	2	5	1	.....	.....	.....	.....
Other tributaries of Kansas River	.....	.....	1	1	.....	.....	.....	.....	.....
Other tributaries of Missouri River	220	82	863	4,360	1,444	623	340	81	54,796
Mississippi River and tributaries, exclusive of Missouri River	**1,704**	**259**	**2,957**	**41,974**	**4,934**	**5,364**	**3,332**	**381**	**1,163,306**
Mississippi River direct	340	.....	241	869	174	1,553	182	6	43
Arkansas River and tributaries	1,249	242	2,505	39,166	4,629	3,550	3,062	367	1,155,259
Arkansas River direct	61	32	230	11,328	1,163	1,443	1,875	44	395,182
South Fork	30	.....	65	348	122	42	25	.....	.....
Fountain River	6	9	113	1,046	219	64	21	36	13,246
St. Charles River	87	12	114	757	162	42	24	14	3,418
Huerfano River	285	22	336	4,336	581	506	350	40	111,627
Apishapa River	39	15	52	1,806	103	21	32	15	54,821
Purgatoire or Las Animas River and tributaries	110	11	156	2,615	304	52	34	19	403,099
Purgatoire or Las Animas River direct	101	9	147	2,606	356	38	30	18	403,099
Trinchera River	9	2	9	9	8	14	4	1	.....
Canadian River and tributaries	264	63	314	8,123	670	498	306	67	79,212
Canadian River direct	1	2	11	59	12	17	3	6	52
Cimarron River	60	9	63	2,035	178	87	154	7	21,235
Vermejo River	23	10	42	2,357	98	15	52	10	18,111
Ocate Creek	27	3	29	1,217	74	61	19	14	20,759
Mora River	108	12	113	1,075	231	262	41	6	277
Ute Creek	3	2	4	6	4	6	1	1	1
Other tributaries of Canadian River	42	25	52	1,374	79	50	36	23	18,777
Cimarron River	52	9	89	642	150	228	70	9	59
Other tributaries of Arkansas River	315	69	1,096	8,165	1,089	654	325	123	94,595
St. Francis River	.....	.....	1	2	.....	.....	.....	.....	.....
White River	62	14	58	1,067	49	40	11	5	.....
Ouachita River	1	.....	1	.....	.....	.....	.....	.....	.....
Red River and tributaries	13	3	54	163	53	163	75	3	8,004
Other tributaries of Mississippi River	39	.....	37	707	29	58	2	.....	.....
Gulf streams other than Mississippi River and Rio Grande	**148**	**162**	**1,632**	**20,931**	**2,209**	**3,275**	**2,677**	**360**	**305,415**
Atchafalaya River and tributaries	17	1	91	728	109	62	42	1	2,041
Vermilion River and tributaries	.....	.....	68	1,699	202	1,071	667	1	.....
Mermentau River and tributaries	14	47	771	6,067	863	1,032	568	61	5,058
Calcasieu Lake, River and tributaries	4	4	84	1,700	169	92	168	3	490
Sabine River and tributaries	.....	2	10	592	82	52	58	1	.....
Neches River	.....	.....	7	1,380	40	30	77	.....	.....
Trinity River	.....	1	6	1,022	77	47	102	1	25,000
Brazos River	.....	2	155	287	130	270	136	3	800
Colorado River	46	53	244	3,925	324	333	639	30	8,092
San Antonio River	4	10	50	1,782	60	80	82	24	260,346
Nueces River	54	29	85	163	96	139	42	223	1,987
Other Gulf streams	9	13	61	1,586	67	67	96	12	1,601

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number	Capacity (acre-feet).
Rio Grande and tributaries	**1,555**	**117**	**2,740**	**36,811**	**5,700**	**2,642**	**3,752**	**333**	**3,233,619**
Rio Grande direct	106	32	304	17,925	1,517	632	1,966	66	2,718,543
Saguache River	152	.....	251	752	176	88	73	11	202
San Luis River	40	2	252	1,670	349	50	70	2	179
Alamosa River	30	2	39	1,321	142	32	56	2	31,750
La Jara River	30	.....	31	390	69	9	12	.....	.....
Conejos River	103	2	105	3,188	317	52	72	2	3,001
Trinchera River	27	2	25	159	182	7	4	2	25,500
Rio Costilla	48	.....	52	139	43	.....	.....	.....	.....
Pueblo River	40	.....	42	434	80	7	3	.....	.....
Rio Chama	187	2	183	832	298	167	80	2	150
Rio Santa Cruz	11	.....	32	134	52	10	3	.....	.....
Tesuque Creek	18	.....	39	72	50	7	6	1	.....
Rio Puerco	30	9	50	215	237	41	20	11	44,068
Pecos River and tributaries	394	25	774	5,619	1,168	942	914	150	169,903
Pecos River direct	195	11	323	4,143	577	437	517	107	144,296
Gallinas River	38	5	42	276	83	60	9	8	25,619
Hondo River	99	2	196	547	222	196	161	13	18
Penasco River	16	.....	96	245	102	152	168	.....	.....
Other tributaries of Pecos River	46	7	117	408	184	97	59	28	30
Las Moras Creek	2	1	4	75	8	260	67	.....	.....
Other tributaries of Rio Grande	337	40	557	3,886	1,012	338	406	78	239,663
Independent streams in Rio Grande drainage basin	**84**	**8**	**150**	**3,613**	**190**	**134**	**90**	**18**	**145**
Rio Mimbres	45	5	77	3,168	78	60	13	11	40
Fresno River	33	.....	53	205	66	17	7	5	5
Rio Tularosa	6	3	20	240	46	57	70	2	100
Colorado River and tributaries	**2,465**	**565**	**7,098**	**66,249**	**14,052**	**5,781**	**8,485**	**798**	**1,675,088**
Colorado River direct	5	1	53	7,290	550	668	2,211	.....	.....
Green River and tributaries	919	124	2,067	16,875	4,383	1,900	2,320	138	86,254
Green River direct	25	1	66	1,474	200	26	9	2	114
New Fork	9	2	78	1,011	241	133	86	1	.....
Horse Creek	6	.....	41	403	82	.....	.....	.....	.....
Cottonwood Creek	19	.....	83	485	131	125	75	.....	.....
South Piney Creek	26	1	110	221	103	333	116	.....	.....
La Barge Creek	22	.....	19	131	44	6	2	.....	.....
Fontenelle Creek	20	.....	24	73	35	8	6	.....	.....
Bitter Creek	3	1	21	25	28	1	4	16	1,105
Blacks Creek	156	9	325	1,867	532	54	114	11	3,333
Henrys Fork	45	22	110	301	143	74	42	3	23
Ashley Fork River	109	.....	18	113	75	8	15	.....	.....
Duchesne River	156	8	106	2,416	543	306	771	7	41,871
Price River	13	1	54	636	161	37	34	2	1,248
San Rafael River	11	2	30	591	170	401	570	6	8,800
Yampa River and tributaries	109	57	600	2,736	1,145	192	371	66	8,318
Yampa River direct	16	4	65	498	142	19	12	4	1,569
Little Snake River	10	6	135	873	265	17	7	8	1,346
Other tributaries of Yampa River	83	47	400	1,365	738	156	352	54	5,403
White River	43	16	265	2,883	408	114	43	19	1,703
Other tributaries of Green River	147	4	117	1,509	282	82	62	5	19,739
Grand River and tributaries	857	239	2,914	25,214	5,562	1,484	2,016	295	133,742
Grand River direct	45	10	149	2,827	493	308	257	11	13,627
Fraser River	14	2	61	352	112	2	1	2	10
Muddy Creek	49	10	50	254	64	.....	.....	10	1,727
Blue River	40	3	143	467	172	34	7	7	39
Eagle River	12	4	122	449	202	10	10	8	106
Roaring Fork	17	4	240	1,314	413	163	58	13	804
Plateau Creek	2	41	104	790	213	127	81	45	15,972
Gunnison River and tributaries	388	118	1,210	12,419	2,257	388	601	140	47,521
Gunnison River direct	14	1	63	1,168	151	35	19	1	120
Taylor River	.....	.....	4	15	6	.....	.....	.....	.....
Tomichi Creek	157	1	258	1,731	279	7	5	1	.....
North Fork Creek	19	17	138	1,154	306	87	76	26	11,134
Smith Fork River	5	9	46	562	119	21	38	9	1,265
Uncompahgre River	26	4	180	2,402	446	151	359	5	220
Other tributaries of Gunnison River	167	86	521	5,387	950	87	104	98	34,782
Rio Dolores	87	19	255	2,022	622	143	417	21	42,988
Other tributaries of Grand River	203	28	580	3,720	1,014	309	584	38	10,948
Fremont River	148	117	43	548	121	87	65	13	4,078
Virgin River	120	13	233	773	358	224	189	26	20,009
San Juan River and tributaries	133	21	521	4,510	1,242	412	282	35	5,566
San Juan River direct	27	6	67	669	176	64	89	15	1,591
Mancos River	11	.....	38	285	87	11	12	1	150
Los Pinos River	9	.....	67	853	200	24	69	.....	.....
Animas River	45	.....	144	1,694	384	130	52	4	.....
La Plata River	30	3	69	612	185	47	48	2	165
Other tributaries of San Juan River	11	12	136	397	210	136	12	13	3,660
Kanab Wash	1	.....	1	1	.....	4	4	4	258
Williams River	5	.....	37	40	34	1	1	1	4
Little Colorado River and tributaries	32	14	82	341	156	43	43	45	37,098
Little Colorado River direct	19	9	36	208	78	15	22	18	30,823
Nutrioso Creek	4	1	7	17	8	.....	.....	4	1,050
Concho Creek	.....	.....	2	3	2	1	1	2	625
Other tributaries of Little Colorado River	9	4	37	113	68	27	20	21	4,600

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Colorado River and tributaries—Continued.									
Gila River and tributaries	231	35	1,031	10,449	1,515	866	1,327	215	1,377,432
Gila River direct	31	1	112	2,819	439	230	211	2	210
San Francisco River	54	1	90	110	66	11	2	3	.....
San Pedro River	30	9	114	270	162	31	15	45	894
Santa Cruz River	31	5	237	1,196	260	147	75	26	392
Salt River and tributaries	44	3	174	5,084	290	313	911	11	1,367,307
Salt River direct	8	1	18	4,447	111	271	808	2	1,367,300
Tonto Creek	0	1	34	58	26	.....	.....	1	1
Rio Verde	22	.....	75	359	107	29	7	5	1
Other tributaries of Salt River	5	1	47	220	46	13	6	3	5
Agua Fria River	12	5	106	525	107	105	101	16	24
Hassayampa River	1	1	24	46	18	.....	.....	1	180
Other tributaries of Gila River	28	10	174	399	173	29	12	111	8,425
Other tributaries of Colorado River	14	1	116	208	131	92	27	26	11,547
Whitewater Draw and tributaries	**6**	**51**	**175**	**553**	**121**	**92**	**7**	**76**	**85,071**
Great Basin Drainage	**3,244**	**460**	**5,545**	**57,717**	**11,292**	**6,381**	**6,486**	**935**	**2,395,379**
Tributaries of Great Salt Lake	1,128	158	1,705	19,501	4,512	2,106	2,487	208	596,859
Bear River and tributaries	670	104	967	10,589	2,858	913	739	92	30,708
Bear River direct	78	7	206	5,061	737	152	280	11	3,659
Little Bear River	47	6	104	1,074	195	395	183	4	4
Malad River	2	1	3	13	10	.....	.....	1	2
Thomas Fork	25	.....	29	203	63	.....	.....	.....	.....
Mill Creek	4	.....	8	27	38	4	2	.....	.....
Little Malad Creek	190	58	12	400	788	49	49	4	12,788
Other tributaries of Bear River	324	32	605	3,811	1,027	313	225	72	14,255
Weber River and tributaries	256	18	391	2,823	570	146	106	52	30,794
Weber River direct	72	1	101	1,417	181	53	46	5	22
Ogden River	27	.....	73	480	109	57	29	4	4
East Canyon Creek	38	1	40	179	49	5	5	2	28,004
Other tributaries of Weber River	119	16	177	747	231	31	26	41	2,764
Jordan River and Utah Lake and tributaries	202	36	347	6,089	1,084	1,047	1,642	64	535,357
Jordan River direct	14	4	20	1,151	296	101	26	3	600
Spanish Fork River	12	6	46	1,358	93	95	202	8	502,116
Hobble Creek	1	.....	13	31	9	10	4	1	2
Provo River	31	11	99	1,752	304	416	262	21	6,681
American Fork River	27	.....	23	70	43	63	130	4	.....
Little Cottonwood Creek	21	1	36	650	60	50	45	1	750
Big Cottonwood Creek	32	3	27	228	58	160	31	4	300
Other tributaries of Jordan River and Utah Lake	64	11	83	849	221	152	942	22	24,908
Independent streams	2,116	302	3,840	38,216	6,780	4,275	3,999	727	1,798,520
Sevier River and tributaries	95	50	321	7,762	1,391	903	1,195	63	869,405
Sevier River direct	23	13	44	4,693	408	330	508	14	741,900
San Pitch River	26	20	80	970	372	254	401	21	30,608
Otter Creek	2	3	12	86	42	24	9	3	3,900
South Fork	9	.....	32	381	114	65	42	2	24,015
Other tributaries of Sevier River	35	14	153	1,632	395	230	235	23	68,892
Beaver River	36	14	128	775	210	196	229	9	40,555
Coal Creek	22	2	58	1,158	136	97	63	63	967
Deep Creek (Utah)	3	.....	21	50	36	.....	.....	2	.....
Grouse Creek	14	3	29	35	45	.....	.....	1	10
Humboldt River and tributaries	715	12	1,040	1,204	1,292	965	281	27	42,791
Humboldt River direct	55	3	51	384	147	303	119	5	32,025
East Fork of Humboldt River	195	2	226	75	188	241	44	4	688
La Moille Creek	173	.....	196	90	193	128	41	.....	.....
North Fork of Humboldt River	47	.....	62	48	109	86	22	.....	.....
South Fork of Humboldt River	161	.....	281	297	354	96	29	4	7,974
Pine Creek	.....	.....	1	.....	.....	2	1	.....	.....
Reese River	47	.....	170	155	237	13	4	.....	.....
Little Humboldt River	6	.....	4	.....	4	.....	.....	.....	.....
Other tributaries of Humboldt River	31	7	49	155	60	96	21	14	2,104
Truckee River and tributaries	54	5	40	2,465	158	21	14	8	201
Truckee River direct	23	2	26	426	134	17	11	1	2
Steamboat Creek	6	1	8	2,001	14	4	3	1	.....
Other tributaries of Truckee River	25	2	6	38	10	.....	.....	6	199
Carson River and tributaries	143	13	113	3,905	190	193	341	16	400,064
Carson River direct	80	9	97	688	114	50	16	9	4
Tributaries of Carson River	63	4	16	3,217	76	143	325	7	400,060
Walker River and tributaries	77	14	184	2,192	659	99	162	9	11,503
Walker River direct	67	1	164	2,177	645	75	160	7	11,503
Tributaries of Walker River	10	13	20	15	14	24	2	2	.....
Duck Creek	14	.....	21	45	36	17	12	1	50
Steptoe Creek	14	1	17	47	48	20	13	3	4,000
Long Valley Creek	59	2	102	585	131	90	44	6	857
Mono Lake and tributaries	4	3	21	525	26	11	8	3	34,700
Susan River	93	7	82	1,861	215	114	45	15	63,949
Mohave River	2	.....	21	189	23	9	4	18	27
Owens River	6	4	53	1,598	138	5	4	20	26,006
San Jacinto River	7	11	32	251	50	28	14	94	105,688
Whitewater River	3	.....	12	57	47	15	2	41	50
Quinn River	5	1	14	98	22	20	16	2	.....
Deep Creek (Oregon)	1	.....	10	18	11	.....	.....	.....	.....
Donner and Blitzen River	44	6	30	239	74	122	84	6	57,580
Silver Creek	24	1	24	398	39	31	2	.....	.....
Silvies River	206	72	187	876	220	115	54	17	360
Thomas Creek	.....	.....	10	10	28	.....	.....	1	.....
Other independent streams	475	81	1,270	11,873	1,555	1,204	1,412	302	139,757

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Columbia River and tributaries	**6,494**	**603**	**12,614**	**134,536**	**22,700**	**11,986**	**10,099**	**646**	**5,711,783**
Columbia River direct	9	18	99	632	155	174	44	41	1,530
Kootenai River	30	7	64	1,095	93	41	26	13	324
Clark Fork and tributaries	715	103	2,106	14,618	3,136	1,747	1,103	62	93,705
Clark Fork direct	6	1	87	1,399	85	10	1	3	50
Missoula River and tributaries	609	79	1,863	11,998	2,655	1,217	367	46	8,040
Missoula River direct	5	1	15	200	116	11	.....	1	.....
Hellgate River	246	27	777	4,623	1,195	455	142	24	527
Big Blackfoot River	137	10	310	2,378	364	193	48	3	200
Bitter Root River	173	37	644	4,073	870	424	158	10	7,634
Other tributaries of Missoula River	48	4	117	724	110	134	19	8	279
Flathead River	100	23	156	1,221	396	520	735	13	85,015
Colville River	40	1	101	393	174	131	21	3	.....
Spokane River and tributaries	34	11	76	912	120	92	156	36	6,262
Spokane River direct	15	8	61	802	101	74	134	31	5,662
Coeur d'Alene Lake and River	19	3	15	110	19	18	22	5	600
Okanogan River and tributaries	12	11	124	552	158	69	132	19	24,136
Okanogan River direct	1	3	39	45	24	25	4	8	2,211
Salmon Creek	1	3	15	143	32	3	67	5	16,550
Other tributaries of Okanogan River	10	5	70	364	102	41	61	6	5,375
Methow River	52	11	166	1,230	231	59	45	19	200
Entiat River	5	1	32	85	41	.....	.....	.....	.....
Wenatchee River	41	6	87	553	195	66	18	8	2,000
Crab Creek	24	9	67	100	34	18	9	10	4,501
Yakima River and tributaries	105	10	459	7,486	1,070	477	1,156	10	423,810
Yakima River direct	12	7	88	4,823	473	446	1,079	7	423,800
Wilson Creek	20	.....	50	163	62	6	5	1	10
Naches River	2	.....	63	724	113	7	21	.....	.....
Ahtanum River	10	.....	49	180	82	3	1	.....	.....
Other tributaries of Yakima River	61	3	209	1,596	340	15	50	2	.....
Snake River and tributaries	3,598	304	6,510	89,418	12,728	5,722	6,188	321	4,832,921
Snake River direct	60	11	206	19,056	998	1,459	2,443	12	2,641,746
Gros Ventre River	20	.....	29	118	64	1	1	.....	.....
Little Gros Ventre	14	.....	32	103	50	.....	.....	.....	.....
Salt River	50	2	169	1,355	297	116	54	1	80
Henrys Fork	226	25	274	12,693	750	340	437	20	8,462
South Fork of Snake River	112	7	146	8,609	431	161	620	7	15,332
Blackfoot River	43	3	45	1,214	182	136	172	3	200,060
Port Neuf River	101	7	149	1,274	345	58	76	10	59,226
Raft River	101	2	99	642	133	42	30	.....	.....
Goose Creek	35	.....	3	100	100	35	70	3	30,000
Salmon Falls River	40	6	48	1,857	102	56	250	6	206,600
Little Wood River	83	9	107	1,893	234	22	7	2	40,000
Big Wood River	188	15	234	4,765	421	108	443	13	101,993
Bruneau River	141	18	171	826	204	140	58	12	10,772
Owyhee River	348	27	432	2,508	573	188	106	25	27,205
Boise River	70	14	108	6,699	801	744	191	18	573,203
Malheur River	256	34	350	2,022	540	92	84	31	368,446
Payette River	51	12	267	4,450	645	63	140	17	63,284
Weiser River	30	9	134	1,822	389	81	89	10	95,796
Burnt River	213	8	318	781	400	20	14	14	12,331
Powder River	291	19	651	3,754	1,133	287	202	37	13,484
Pine Creek	51	4	83	176	107	7	18	3	10,350
Imnaha River	34	1	86	102	73	16	13	1	200
Salmon River	363	12	980	4,747	1,423	898	270	14	2,183
Grande Ronde River	207	19	482	1,894	491	329	138	6	205,230
Clearwater River	3	2	13	69	23	8	1	6	4
Asotin Creek	2	1	1	1	.....	1	.....	1	100
Pataha River	10	.....	33	377	24	31	1	1	.....
Palouse River	13	5	21	219	31	42	11	2	4
Other tributaries of Snake River	443	32	749	5,322	1,764	241	249	46	56,740
Independent streams in Snake River Basin	303	17	429	6,428	867	490	288	14	144,312
Camas Creek	81	6	97	3,042	105	159	112	5	65,170
Beaver Creek	27	1	34	72	23	2	4	1	35
Medicine Lodge	62	1	72	266	61	127	44	2	412
Little Lost River	33	2	59	774	101	15	7	2	22,000
Big Lost River	98	7	160	2,237	491	183	119	4	56,686
Other independent streams	2	.....	7	37	26	4	2	.....	.....
Walla Walla River	236	14	412	1,453	1,205	1,905	159	8	15,000
Klickitat River	19	.....	30	352	66	17	4	.....	.....
White Salmon River	19	3	28	478	99	21	15	3	.....
Umatilla River	139	10	229	2,007	318	201	143	4	54,700
Willow Creek	71	7	94	110	94	18	11	.....	.....
John Day River	504	8	670	1,052	655	151	52	10	39,236
Deschutes River	361	25	390	4,023	768	226	333	8	52,927
Hood River	34	5	72	435	88	86	132	5	13
Willamette River	15	.....	40	148	53	15	5	2	.....
Other tributaries of Columbia River	128	22	329	976	352	260	59	50	16,197

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Number of diverting dams.	Number of storage dams.	MAIN DITCHES.			LATERAL DITCHES.		RESERVOIRS.	
			Number.	Capacity (second-feet).	Length (miles).	Number.	Length (miles).	Number.	Capacity (acre-feet).
Pacific Ocean streams, other than the Colorado and Columbia Rivers	**2,221**	**460**	**5,926**	**100,804**	**13,835**	**8,450**	**10,304**	**2,771**	**1,815,714**
Dungeness River	6	.....	7	570	36	75	32	.....	.....
McDowell Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rogue River and tributaries	257	18	645	1,978	837	169	117	47	35,882
Rogue River direct	8	.....	26	149	38	2	3	9	1
Little Butte Creek	13	2	58	161	108	86	56	3	5,350
Bear Creek	29	6	99	512	159	18	37	10	30,507
Evans Creek	22	.....	34	66	41	11	3	.....	.....
Applegate River	55	4	164	434	241	17	8	15	16
Illinois River	87	3	135	400	127	19	10	4	1
Other tributaries of Rogue River	43	3	129	256	123	16	6	6	7
Klamath River and tributaries	505	41	1,046	8,878	1,289	543	437	90	1,022,365
Klamath River direct	452	23	947	5,778	1,101	287	113	70	95,054
Lost River	8	13	39	1,889	71	113	232	14	925,923
Sprague River	9	5	15	212	34	6	8	6	1,388
Other tributaries of Klamath River	36	.....	45	999	83	137	84	.....	.....
Russian River	9	10	18	23	8	25	364	10	142
Sacramento River and tributaries	859	200	1,821	23,514	4,574	1,743	1,955	220	348,435
Sacramento River direct	6	3	192	5,803	585	559	693	24	285
Pit River	322	63	489	5,160	730	150	78	63	202,877
Cow Creek	40	.....	64	367	118	30	23	1	.....
Cottonwood Creek	16	1	41	147	78	19	30	8	6,300
Battle Creek	26	.....	71	358	114	17	4	.....	.....
Stony Creek	44	5	63	1,590	81	22	130	4	51,001
Feather River	221	52	332	4,399	455	424	130	12	243
Yuba River	41	33	136	1,235	481	65	96	32	56,672
Cache Creek	6	3	20	1,197	87	30	115	4	181
American River	51	31	109	1,264	1,498	135	374	53	30,082
Other tributaries of Sacramento River	86	9	304	1,994	347	292	282	19	194
San Joaquin River and tributaries	269	85	1,452	55,628	5,995	4,394	6,904	1,419	329,522
San Joaquin River direct	23	2	176	11,431	1,237	1,203	2,103	120	1,037
Kern River	17	11	142	6,273	427	156	140	188	60,460
Tulare Lake	26	.....	67	562	101	200	601	671	110,553
Tule River	44	2	115	2,465	426	209	155	118	523
Kaweah River	19	1	95	5,133	339	271	497	72	2,348
Kings River	27	5	128	17,194	892	465	981	67	6,116
Fresno River	5	.....	7	314	5	6	107	19	263
Merced River	17	1	159	2,171	476	507	290	9	8,019
Tuolumne River	17	15	110	5,834	626	835	907	12	86,007
Stanislaus River	12	13	59	1,444	190	142	813	17	42,526
Calaveras River	22	8	129	224	86	33	12	25	17
Mokelumne River	31	25	126	1,598	1,024	62	153	33	678
Cosumnes River	6	.....	13	103	55	2	15	2	.....
Other tributaries of San Joaquin River	3	2	126	882	111	213	130	66	10,066
Tributaries of San Francisco Bay other than Sacramento and San Joaquin Rivers	26	9	78	381	45	149	40	44	235
Coyote Creek	6	.....	6	24	5	.....	.....	3	1
Guadalupe River	8	.....	12	271	21	4	20	.....	.....
Other tributaries	12	9	60	86	19	145	20	41	234
Pajaro River	29	9	94	278	66	81	29	19	5,995
Salinas River	7	4	140	553	117	403	98	21	73
Santa Maria River	1	1	16	69	13	25	3	8	36
Santa Ynez River	9	8	18	227	10	10	4	16	2,502
Santa Clara River	15	3	38	191	49	56	30	30	2,741
Los Angeles River	11	3	70	266	81	191	78	164	4,950
San Gabriel River	18	1	54	3,940	89	61	47	129	7,168
Santa Ana River	39	12	123	2,096	302	139	34	139	3,514
San Diego River	4	2	11	.....	.....	5	4	63	18,904
Other Pacific Ocean streams	157	54	286	2,212	324	381	128	352	33,250

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Total, states included	**8,878.3**	**4,606**	**935,057**	**32,094**	**16,396,549**	**29,458**	**748,971**	**33,804**	**36,275,005**	**41**
Missouri River and tributaries	**89.5**	**41**	**4,271**	**385**	**171,464**	**593**	**18,329**	**689**	**800,218**	**22**
Missouri River direct	4.3					31	6,602	45	168,725	32
Jefferson River and tributaries	0.1	2	2			3	135	4	4,968	24
Jefferson River direct	0.1					2	25	2	1,968	24
Beaverhead River		1								
Boulder River						1	110	2	3,000	24
Other tributaries of Jefferson River		1	2							
Gallatin River	0.5					4	70	4	5,320	16
Smith River						1	18	1	6,000	9
Sun River	1.2					15	326	20	20,210	15
Teton River	0.5	3	1,000	1	10	8	130	8	13,410	17
Marias River	1.6			3	8,000	22	623	22	37,165	15
Judith River	2.4			1	1,500	8	72	16	10,600	11
Musselshell River						10	178	12	16,250	19
Milk River and tributaries	1.2	1	50			22	377	23	24,345	16
Milk River direct						4	70	4	2,570	18
Other tributaries of Milk River	1.2	1	50			18	307	19	21,775	16
Yellowstone River and tributaries	13.1	21	194	6	1,005	101	3,905	120	182,508	25
Yellowstone River direct	2.0	3	69			35	2,501	45	127,662	24
Clark Fork						2	10	2	470	8
Shields River				1	40					
Big Horn River and tributaries	10.0	1		1	950	20	406	25	11,800	38
Big Horn River direct	4.5			1	950	16	357	20	8,840	40
Popo Agie River	2.0					1	3	1	175	12
Owl Creek	0.1									
No Wood River	0.2									
Shell Creek	0.2					1	26	1	1,200	58
Shoshone River	2.5									
Little Horn River	0.5									
Other tributaries of Big Horn River		1				2	20	3	1,585	10
Tongue River and tributaries	0.3			2		18	361	18	19,275	18
Tongue River direct	0.1					16	286	16	14,575	15
Goose Creek						1	50	1	3,000	38
Other tributaries of Tongue River	0.2			2		1	25	1	1,700	22
Powder River and tributaries	0.3	17	125	2	15	15	570	19	14,670	30
Powder River direct		15	119	1	10	11	245	15	14,265	16
Clear Creek	0.3					2	208	2	200	54
Other tributaries of Powder River		2	6	1	5	2	27	2	205	70
Other tributaries of Yellowstone River	0.5					11	117	11	8,631	12
Little Missouri River	0.1					4	175	4	8,000	32
Moreau River	0.3					3	60	3	1,800	30
Cheyenne River and tributaries	7.0	4	2,750	2	2,800	19	292	19	14,041	
Cheyenne River direct	6.8	4	2,750	1	800	14	173	14	9,550	16
North Fork (Belle Fourche)				1	2,000	4	103	4	3,391	20
South Fork	0.2					1	16	1	1,100	10
White River	0.4			2	2,200	3	53	3	4,000	35
Niobrara River	0.1					1	8	1	480	8
Platte River and tributaries	50.8	6	270	313	143,904	282	3,889	307	220,040	22
Platte River direct				14	10,551	13	180	14	14,580	31
North Platte River and tributaries	3.6	2	40	9	4,330	26	410	34	24,030	21
North Platte River direct	0.7			2	3,180	15	311	16	21,002	22
Grand Encampment Creek	0.1									
Spring Creek		1		2		1		1		
Medicine Bow River	1.0			3		5	33	12	787	18
Muddy Creek	0.5									
Box Elder Creek		1	40							
Laramie River and tributaries	0.4			2	1,150	3	6	3	1,650	13
Laramie River direct	0.3					1		1	500	10
North Laramie River				1	700	1		1	700	16
Chugwater Creek				1	450	1	6	1	450	
Other tributaries of Laramie River	0.1									
Horse Creek	0.1									
Other tributaries of North Platte River	0.8					2	60	2	600	28
South Platte River and tributaries	46.9	4	230	200	129,023	233	3,229	248	176,080	21
South Platte River direct	9.8	3	170	94	44,302	78	1,132	80	52,662	22
Bear Creek	1.0					1	7	5		40
Clear Creek	0.1									
St. Vrain Creek	12.7			1		4	100	4	1,000	22
Big Thompson Creek	1.9			1	1,200	6	106	6	5,831	17
Cache la Poudre River	17.5	1	60	123	53,643	107	1,386	107	74,943	21
Lone Tree Creek	0.5			20	6,968	13	172	20	10,160	24
Big Beaver Creek				7	15,250	4	65	6	15,250	26
Lodgepole Creek				3	2,835	5	90	5	8,567	11
Other tributaries of South Platte River	3.4			41	4,825	15	171	15	8,267	26
Loup River	0.3					7	49	7	4,280	17
Other tributaries of Platte River						3	21	4	461	30
Kansas River and tributaries	2.5			45	10,600	22	844	37	39,903	30
Republican River	2.0			14	8,500	13	491	13	32,703	33
Smoky Hill River	0.1			31	2,100	6	303	21	5,350	29
Big Blue River	0.4					2	30	2	1,000	18
Other tributaries of Kansas River						1	20	1	850	25
Other tributaries of Missouri River	3.4	4	5	12	1,445	34	512	40	22,444	18

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				Average lift (feet).
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps. Number.	Pumps. Capacity (gallons per minute).	
Mississippi River and tributaries, exclusive of Missouri River	**148.3**	**27**	**6,240**	**2,085**	**1,876,840**	**1,539**	**73,739**	**1,715**	**2,237,441**	**45**
Mississippi River direct	6.2					67	2,846	74	102,500	12
Arkansas River and tributaries	140.9	24	3,640	1,354	934,452	768	34,404	872	1,119,743	42
Arkansas River direct	13.8	2	315	572	641,744	503	27,146	526	798,295	47
Fountain River	11.7	3	30	19	7,700	8	126	8	8,200	21
St. Charles River	0.4			3	515	2	16	2	475	32
Huerfano River	4.5			11	2,070	6	36	6	2,045	40
Apishapa River	0.3			1	144	1	20	1	144	14
Purgatoire or Las Animas River	0.1					1	7	1	500	7
Canadian River and tributaries	19.0			20	6,417	21	259	26	6,663	79
Canadian River direct	4.2			15	3,106	15	193	19	5,141	88
Cimarron River	4.8					1	10	1	1,500	22
Vermejo River	1.1			2		1	50	2		100
Ocate Creek	1.5									
Mora River				1	3,300	2	5	2	10	35
Other tributaries of Canadian River	7.4			2	11	2	1	2	12	72
Cimarron River	0.2	6	500	12	5,321	10	221	11	4,817	26
Other tributaries of Arkansas River	90.9	13	2,795	716	270,541	216	6,573	291	298,604	29
Red River and tributaries		3	2,600	49	48,950	63	3,444	67	55,760	76
St. Francis River				56	73,050	52	2,223	64	78,450	31
White River				626	820,388	584	30,537	633	858,688	50
Ouachita River	0.4									
Other tributaries of Mississippi River	0.8					5	285	5	22,300	15
Gulf streams, other than Mississippi River and Rio Grande	**158.9**	**127**	**57,009**	**1,615**	**2,072,580**	**2,335**	**136,953**	**3,208**	**9,202,748**	**37**
Atchafalaya River and tributaries	42.2	1		42	59,980	105	4,070	171	230,075	19
Vermilion River and tributaries		2	425	82	67,007	136	7,052	222	694,044	29
Mermentau River and tributaries	0.1			594	1,209,750	806	56,300	1,208	2,027,213	35
Calcasieu Lake, River, and tributaries	0.4	5	5,800	92	243,400	128	13,933	161	937,294	30
Sabine River and tributaries				2	27,500	12	2,905	22	241,500	20
Neches River						6	5,850	23	1,929,500	24
Trinity River	1.5					11	7,688	20	445,100	34
Brazos River	2.2	3	3,500	150	136,332	166	6,276	175	153,585	63
Colorado River	8.5	3	5,400	57	30,667	311	13,500	359	912,048	30
San Antonio River	10.9	25	15,465	43	12,864	77	1,438	80	31,039	39
Nueces River	92.6	81	26,065	275	72,937	321	6,533	342	160,472	47
Other Gulf streams	0.5	7	354	278	212,143	262	11,408	340	540,278	42
Rio Grande and tributaries	**81.5**	**1,015**	**401,081**	**416**	**239,199**	**522**	**28,867**	**617**	**2,670,157**	**39**
Rio Grande direct	42.8	329	13,595	31	13,381	134	22,115	202	2,398,079	46
Saguache River		83	2,672	1		1		1		
San Luis River	0.2	22	175							
Alamosa River	0.1	8	207							
Conejos River	0.1	1	20							
Trinchera River	4.0									
Rio Santa Cruz	0.1									
Rio Puerco						1		1		96
Pecos River and tributaries	18.8	563	384,325	287	174,938	282	5,174	309	221,280	31
Pecos River direct	6.1	300	207,465	138	92,107	144	3,098	159	124,701	34
Gallinas River	0.5			1	3	1		1	3	75
Hondo River	11.0	176	125,606	79	46,585	74	1,041	79	57,275	21
Penasco River	0.5	51	30,132	10	7,210	11	216	11	9,000	29
Other tributaries of Pecos River	0.7	36	21,122	59	29,033	52	819	59	30,310	36
Las Moras Creek						1	6	1	250	20
Other tributaries of Rio Grande	15.4	9	87	97	50,880	103	1,572	103	50,539	53
Independent streams in Rio Grande drainage basin	**8.8**	**1**	**75**	**87**	**46,944**	**89**	**2,074**	**92**	**46,779**	**57**
Rio Mimbres	1.1	1	75	85	46,825	86	2,065	90	46,660	57
Fresno River	7.7									
Rio Tularosa				2	119	3	9	2	119	68
Colorado River and tributaries	**168.5**	**370**	**34,057**	**803**	**974,258**	**621**	**24,194**	**881**	**1,069,324**	**43**
Colorado River direct	0.4			4	1,650	9	487	12	82,200	23
Green River and tributaries	1.5	2		1	1,350	18	647	23	44,920	16
Green River direct	0.4			1	1,350	10	559	14	13,085	29
Bitter Creek		2								
Duchesne River						1		2	27,000	70
Price River	0.6									
Yampa River and tributaries	0.3					4	48	4	3,200	15
Yampa River direct						4	48	4	3,200	15
Little Snake River	0.1									
Other tributaries of Yampa River	0.2									
White River	0.2					1	10	1	900	10
Other tributaries of Green River						2	30	2	735	17
Grand River and tributaries	45.9	1				38	3,728	46	40,688	27
Grand River direct	12.5					18	2,872	24	32,882	29
Muddy Creek	0.1									
Blue River	1.2									
Eagle River	5.2					2	33	2	1,000	58
Roaring Fork	0.3									
Plateau Creek	0.1									

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Colorado River and tributaries—Continued.										
Grand River and tributaries—Continued.										
Gunnison River and tributaries	18.1					17	822	19	6,806	22
Gunnison River direct	1.0					13	759	15	5,706	20
Tomichi Creek	0.4									
North Fork River	2.8					1	8	1	300	14
Smith Fork River	5.1									
Uncompahgre River	4.5					1	40	1		53
Other tributaries of Gunnison River	4.3					2	15	2	800	16
Rio Dolores	1.2					1	1	1		15
Other tributaries of Grand River	7.2	1								
Fremont River	1.0									
Virgin River	7.6	4	106	8	1,730	9	75	10	3,145	30
San Juan River and tributaries	7.2	10	1,035	1		4	27	4	1,200	128
San Juan River direct	7.1	2	90			2	22	2	1,200	85
Los Pinos River	0.1									
Animas River		4	100							
Other tributaries of San Juan River		4	845	1		2	5	2		170
Kanab Wash	1.3									
Williams River	10.1			5	2,015	6	39	8	2,590	20
Little Colorado River and tributaries		2		2	1,000	1	1	2	1,000	30
Little Colorado River direct		2								
Tributaries of Little Colorado River				2	1,000	1	1	2	1,000	30
Gila River and tributaries	90.4	298	14,044	774	965,338	527	19,091	767	890,248	45
Gila River direct	1.3			78	78,531	80	2,382	84	92,581	34
San Francisco River	1.4			4	225	12	70	13	6,110	19
San Pedro River	5.1	133	5,195	25	11,474	27	285	29	12,949	30
Santa Cruz River	35.0			365	576,234	241	8,073	366	528,649	44
Salt River and tributaries	4.3	1		132	150,874	75	2,653	124	153,184	68
Salt River direct	1.5			72	75,319	14	629	60	75,719	54
Tonto Creek				1	500	2	25	2	1,500	16
Rio Verde	1.8	1		3		11	96	11	1,070	63
Other tributaries of Salt River	1.0			56	75,055	48	1,903	51	74,895	75
Agua Fria River	34.3	1		114	120,685	41	4,749	100	68,575	47
Hassayampa River	4.1			15	6,420	13	204	13	5,810	35
Other tributaries of Gila River	4.9	163	8,849	41	20,895	38	675	38	22,390	48
Other tributaries of Colorado River	3.1	53	18,872	8	1,175	9	99	9	3,333	32
Whitewater Draw and tributaries	**5.1**	**10**	**503**	**209**	**72,787**	**198**	**2,403**	**209**	**73,967**	**44**
Great Basin Drainage	**945.5**	**1,861**	**165,497**	**1,431**	**461,393**	**1,173**	**27,361**	**1,270**	**1,236,706**	**46**
Tributaries of Great Salt Lake	108.9	452	42,248	68	16,067	144	10,490	175	701,160	37
Bear River and tributaries	23.3	171	12,635	57	11,597	104	3,016	111	118,285	40
Bear River direct	7.7			2	902	29	2,208	32	80,025	37
Little Bear River	2.0	29	3,025			4	50	4	3,740	18
Malad River		2	219							
Little Malad Creek		57	7,468							
Other tributaries of Bear River	13.6	83	1,923	55	10,695	71	758	75	34,520	42
Weber River and tributaries	8.2	33	1,358	6	1,640	23	232	25	27,145	16
Weber River direct	1.3	12	388			9	106	10	6,615	14
Ogden River	1.8	9	320	1	230	1	7	1	230	33
Other tributaries of Weber River	5.1	12	650	5	1,410	13	119	14	20,300	17
Jordan River and Utah Lake and tributaries	77.4	248	28,255	5	2,830	17	7,242	39	555,730	38
Jordan River direct	0.3	9	130			5	4,300	20	388,500	19
Spanish Fork River	9.8	21	1,390							
Hobble Creek		18	766	1		1	6	1		14
Provo River	1.2	61	11,716	1	830	1	20	1	900	45
American Fork River	2.2	27	2,665	1	900	3	23	3	1,830	21
Big Cottonwood Creek	2.0	9	92			1	1	1	500	25
Other tributaries of Jordan River and Utah Lake	61.9	103	11,496	2	1,100	6	2,892	13	164,000	65
Independent streams	836.6	1,409	123,249	1,363	445,326	1,029	16,871	1,095	535,546	48
Sevier River and tributaries	9.0	258	38,863	3	178	8	117	10	18,318	30
Sevier River direct	1.9	184	27,127			1		2	11,250	
San Pitch River	3.4	16	3	1	150	1	5	1	450	4
Otter Creek		6	112							
Other tributaries of Sevier River	3.7	52	11,621	2	28	6	112	7	6,618	35
Beaver River	1.5	1		11	3,610	9	91	9	4,010	21
Coal Creek	0.7	135	9,955	41	10,500	20	270	24	10,400	47
Grouse Creek				1	265	1	6	3	265	240
Humboldt River and tributaries	15.7	12	805	18	2,540	18	71	19	22,495	30
Humboldt River direct	2.0	2		8	1,495	8	34	8	2,345	32
East Fork of Humboldt River				1	25	1		1	25	12
North Fork of Humboldt River	0.4			1		1	8	1		30
South Fork of Humboldt River				1	100	1	5	1	100	12
Pine Creek				1	10	1	10	1	10	
Reese River		4	190	4		3		3		
Other tributaries of Humboldt River	13.3	6	615	2	910	3	14	4	20,015	39
Truckee River and tributaries	0.9			1	250	1	6	1	250	8
Truckee River direct	0.7									
Tributaries of Truckee River	0.2			1	250	1	6	1	250	8

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Great Basin Drainage—Continued.										
Independent streams—Continued.										
Carson River and tributaries	4.6	3	22	1	50	12	134	13	1,650	12
Carson River direct	1.1			1	50	4	53	4	50	13
Tributaries of Carson River	3.5	3	22			8	81	9	1,600	11
Walker River and tributaries		26	242	71	5	2	2	2		10
Walker River direct		17	240	70	5	2	2	2		10
Tributaries of Walker River		9	2	1						
Duck Creek	0.1	2	794	6	2,285	5	56	8	2,465	20
Steptoe Creek				4	503	4	17	4	1,203	23
Long Valley Creek	2.1			4	480	3	9	3	1,180	17
Susan River	2.0			1	75	4	34	4	3,460	23
Mohave River	28.8	31	4,874	88	45,477	86	2,145	86	45,960	80
Owens River	388.5	23	537	9	4,088	12	137	12	4,558	24
San Jacinto River	145.0	9	115	236	66,833	183	3,546	203	76,386	73
Whitewater River	77.5	242	36,860	325	121,466	235	3,212	247	126,356	41
Quinn River				10	50	3	4	5		25
Deep Creek (Oregon)		1				1	6	2	1,000	10
Donner and Blitzen River		1	10			1		1		16
Silver Creek		1	2	2	450	3	6	3	550	15
Silvies River				2	1,200	2	26	2	1,265	22
Other independent streams	160.2	664	30,170	532	185,021	416	6,976	434	213,775	40
Columbia River and tributaries	1,125.2	176	27,135	752	277,555	1,547	62,451	1,745	2,522,910	50
Columbia River direct	164.7	8	4,390	175	58,401	334	6,493	359	233,881	66
Kootenai River	3.6	2	30			1		1	5	10
Clark Fork and tributaries	27.8	11	3,333	3	80	27	283	27	12,447	32
Clark Fork direct	2.5									
Missoula River and tributaries	17.2	1	2,250	3	80	11	106	11	3,282	24
Missoula River direct	3.8			2		6	52	6	1,096	29
Hellgate River	3.2	1	2,250	1	80	2	10	2	130	29
Big Blackfoot River	0.4					1	16	1	650	12
Bitter Root River	3.4					1	12	1	1,406	7
Other tributaries of Missoula River	6.4					1	16	1		
Flathead River	8.1	10	1,083			16	177	16	9,165	37
Colville River	14.6			1	40	5	23	5	8,450	55
Spokane River and tributaries	163.5			47	58,504	89	4,468	104	113,684	77
Spokane River direct	132.7			47	58,504	83	3,476	93	68,643	79
Coeur d'Alene Lake and River	30.8					6	992	11	50,041	51
Okanogan River and tributaries	20.9			48	13,278	111	1,599	119	47,993	40
Okanogan River direct	14.9			44	12,428	97	930	104	38,258	40
Salmon Creek	0.6					5	607	6	7,385	58
Other tributaries of Okanogan River	5.4			4	850	9	62	9	2,350	26
Methow River	4.8	1		2	115	9	44	9	1,318	56
Entiat River	1.5					4	18	4	310	59
Wenatchee River	26.0			7	1,300	40	337	38	21,114	67
Crab Creek	34.9	3	60	111	36,285	137	2,321	147	66,270	65
Yakima River and tributaries	161.1	3	285	45	9,680	74	3,492	87	78,975	38
Yakima River direct	154.6	3	285	41	7,870	66	3,447	78	75,715	39
Wilson Creek	1.0									
Naches River	4.1			1	335	2	8	3	1,285	55
Ahtanum River				1	125	1	2	1	125	18
Other tributaries of Yakima River	1.4			2	1,350	5	35	5	1,850	18
Snake River and tributaries	261.6	105	9,867	130	40,957	362	39,327	469	1,661,834	30
Snake River direct	81.4	10	860	40	13,855	134	32,089	225	1,340,211	39
Henrys Fork	6.8									
Blackfoot River	1.1									
Port Neuf River	2.8					1	18	1		20
Salmon Falls River	0.1	3	1,900			1	6	1	440	15
Little Wood River	0.2			1	2,500	1	2	1	50	10
Big Wood River	7.0					4	30	4	4,000	19
Bruneau River	0.8	38	1,628	1	27	6	457	7	27,465	24
Owyhee River	2.5	4	787	3	265	61	1,318	61	80,503	28
Boise River	30.5	8	75	2	900	9	324	10	9,650	30
Malheur River	2.0			2	60	10	521	10	30,010	17
Payette River	5.2	1	36	3	9,000	11	608	13	18,256	28
Weiser River	15.1					3	620	5	31,100	76
Burnt River	1.0					3	24	3	965	17
Powder River	7.9	8	315	13	4,780	14	1,601	14	69,132	33
Imnaha River	0.1					4	23	4	500	40
Salmon River	1.9					2	38	2	10,875	56
Grande Ronde River	1.1			20	4,203	35	189	35	10,743	12
Clearwater River	35.9			28	2,750	33	394	36	9,945	21
Asotin Creek	48.0									
Pataha River	1.0			2	350	3	37	3	3,250	52
Palouse River	1.4	8	1,100			2	40	3	4,400	16
Other tributaries of Snake River	13.8	25	3,166	15	2,267	25	388	31	10,339	25

TABLE 17.—IRRIGATION WORKS, CLASSIFIED BY DRAINAGE BASIN: 1920—Continued.

DRAINAGE BASIN.	Pipe lines, length (miles).	FLOWING WELLS.		PUMPED WELLS.		PUMPING PLANTS.				
		Number.	Capacity (gallons per minute).	Number.	Capacity (gallons per minute).	Number.	Engine capacity (horsepower).	Pumps.		Average lift (feet).
								Number.	Capacity (gallons per minute).	
Columbia River and tributaries—Continued.										
Independent streams in Snake River Basin	2.4					9	326	9	96,250	8
Camas Creek						9	326	9	96,250	8
Medicine Lodge	0.4									
Little Lost River	1.9									
Big Lost River	0.1									
Walla Walla River	80.0	34	6,080	124	51,835	143	1,148	155	40,265	24
Klickitat River	2.5					5	26	5	3,875	28
White Salmon River	2.5			2	24	4	42	4	320	33
Umatilla River	14.3	2		6	171	13	115	13	4,246	34
Willow Creek	0.3					1	2	1	200	12
John Day River	5.7			6	475	45	413	47	41,280	25
Deschutes River	8.5			3	386	22	764	26	36,564	38
Hood River	38.6	3	10	1	17	5	36	5	755	70
Willamette River	3.2			15	1,369	30	220	32	7,813	24
Other tributaries of Columbia River	82.2	4	3,080	26	4,638	77	954	79	40,061	88
Pacific Ocean streams, other than the Colorado and Columbia Rivers	6,147.0	978	239,189	24,311	10,203,529	20,841	372,600	23,378	16,414,755	41
Dungeness River	1.0									
McDowell Creek	3.1									
Rogue River and tributaries	20.5	3	10,000	23	11,490	102	723	111	38,147	26
Rogue River direct	7.1			11	6,964	44	347	44	16,597	30
Little Butte Creek	0.8					1	9	1		23
Bear River	6.3			9	1,133	28	120	36	8,138	23
Evans Creek	0.5					5	77	5	1,175	29
Applegate River	2.1					8	93	8	3,200	26
Illinois River	1.0			2	402	7	32	8	3,067	11
Other tributaries of Rogue River	2.7	3	10,000	1	3,000	9	45	9	5,970	25
Klamath River and tributaries	22.1	4	35	16	5,975	74	3,996	83	174,184	25
Klamath River direct	20.8	3		14	4,375	57	3,148	62	142,484	28
Lost River	0.6			2	1,600	14	786	16	21,100	22
Other tributaries of Klamath River	0.7	1	35			3	62	5	10,600	30
Russian River	27.2	1		89	30,234	128	1,058	128	51,239	23
Sacramento River and tributaries	361.2	36	2,957	3,508	1,473,602	3,430	64,163	3,898	4,184,240	26
Sacramento River direct	61.2			514	279,455	655	28,625	807	2,616,658	24
Pit River	2.9	14	693	4	395	36	440	36	32,886	18
Cow Creek	0.4					11	87	11	8,955	14
Cottonwood Creek	0.6					9	100	10	7,565	33
Battle Creek	0.3			2	750	3	63	4	3,300	25
Stony Creek	17.5			68	40,451	61	759	66	45,959	25
Feather River	117.3	9	1,284	845	341,583	728	8,425	828	394,677	22
Yuba River	6.2	2	30	8	2,725	9	1,572	11	2,751	35
Cache Creek	0.4			144	91,211	75	1,524	76	92,391	24
American River	77.8			163	93,694	172	2,358	190	95,338	26
Other tributaries of Sacramento River	76.6	11	950	1,760	623,337	1,671	20,210	1,859	883,260	30
San Joaquin River and tributaries	1,396.6	145	48,828	11,149	4,911,280	9,973	136,911	10,951	7,400,131	34
San Joaquin River direct	184.8	49	15,165	1,531	668,420	1,481	30,086	1,639	1,295,475	25
Kern River	83.1	17	13,350	441	219,674	384	6,676	405	223,606	47
Tulare Lake	261.9	24	8,253	1,100	434,565	906	12,841	1,069	1,330,434	59
Tule River	102.7	2	251	1,146	493,272	974	11,329	1,083	995,319	45
Kaweah River	269.7	3	17	2,136	842,085	1,734	21,932	1,930	870,254	41
Kings River	239.3	34	10,000	2,547	1,183,710	2,283	25,426	2,397	1,225,607	23
Fresno River	6.3	1	200	145	79,255	134	1,520	144	82,738	33
Merced River	5.2	1	75	216	120,465	213	2,774	235	157,865	21
Tuolumne River	14.4	1	400	63	53,880	66	1,231	69	59,360	33
Stanislaus River	41.0			34	26,490	36	1,158	41	73,140	26
Calaveras River	29.4	6	220	565	189,181	544	4,358	585	200,337	26
Mokelumne River	82.2	2	25	709	356,156	694	8,309	765	451,434	33
Cosumnes River	5.5			117	50,870	111	1,788	131	84,740	28
Other tributaries of San Joaquin River	11.1	5	382	399	193,257	413	7,483	458	343,822	28
Tributaries of San Francisco Bay other than Sacramento and San Joaquin Rivers	264.6	74	13,075	2,451	705,510	1,897	36,219	2,102	862,987	55
Coyote Creek	60.2	14	3,450	821	246,483	657	12,407	725	312,320	50
Guadalupe River	99.3	51	7,700	725	242,912	512	13,480	572	278,221	67
Other tributaries	105.1	9	1,925	905	216,115	728	10,332	805	272,446	50
Pajaro River	83.2	17	2,000	688	186,255	370	7,083	417	203,845	35
Salinas River	169.6	18	3,808	697	422,195	239	10,085	286	424,002	25
Santa Maria River	28.9	13	2,700	118	66,393	62	2,934	78	204,534	47
Santa Ynez River	28.7	7	1,510	60	16,401	61	1,611	84	199,630	30
Santa Clara River	154.0	1	700	136	92,049	125	5,126	161	102,184	67
Los Angeles River	528.2	45	24,963	849	443,036	745	16,208	825	458,932	52
San Gabriel River	292.9	160	28,363	1,034	557,934	825	25,675	951	579,153	72
Santa Ana River	4.5	360	62,693	1,816	1,002,743	1,523	45,345	1,836	1,048,090	61
San Diego River	5.2	1	8	533	54,216	319	2,313	374	65,462	56
Other Pacific Ocean stre	5.5	93	37,549	1,144	224,207	968	13,150	1,093	417,995	59

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF PRINCIPAL CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATES INCLUDED: 1919 AND 1909.

[Totals for the states included, used in making comparisons, are reported in the state bulletins on agriculture.]

	CROP.	AREA HARVESTED.					QUANTITY HARVESTED.					
		1919		1909		Per cent of increase.[1]	Unit.	1919		1909		Per cent of increase.[1]
		Acres.	Per cent of total for states included.	Acres.	Per cent of total for states included.			Amount.	Per cent of total for states included.	Amount.	Per cent of total for states included.	
	Cereals:											
1	Corn	263,312	1.2	133,560	0.5	97.1	Bu.	7,525,354	1.6	3,168,973	0.6	137.5
2	Oats	325,523	2.7	739,032	7.4	−56.0	Bu.	9,361,125	2.9	27,213,262	9.8	−65.6
3	Winter wheat	381,127	1.4	548,173	2.1	129.6	Bu.	7,115,303	1.8	14,045,117	3.6	−76.5
4	Spring wheat	877,411	5.0				Bu.	17,679,328	12.2			
5	Barley	280,287	6.9	239,928	5.4	16.8	Bu.	7,202,430	9.8	6,985,841	7.2	3.1
6	Rye	19,014	0.5	5,986	2.9	217.6	Bu.	168,977	0.6	95,885	3.9	76.2
7	Kafir, milo, etc	152,768	4.2	(2)	.....	.....	Bu.	4,100,338	5.7	(2)	.....	.....
8	Rough rice[3]	892,761	99.7	(2)	.....	.....	Bu.	35,032,275	99.9	(2)	.....	.....
	Other grains and seeds:											
9	Clover and alfalfa seed[4]	39,431	25.0	31,948	28.1	23.4	Bu.	161,587	48.7	104,610	39.9	54.5
10	Dry beans, navy, etc	177,752	24.8	17,798	9.1	898.7	Bu.	2,862,567	34.0	314,271	8.8	810.9
11	Dry peas, Canada	51,464	33.0	18,422	20.2	179.4	Bu.	637,560	38.0	254,219	32.0	150.7
	Hay and forage:											
12	Timothy alone	140,607	16.5	202,763	18.8	−30.7	Tons	178,112	18.7	349,920	23.8	−49.1
13	Timothy and clover mixed	392,260	40.8	183,308	14.5	114.0	Tons	569,591	40.1	333,851	17.0	70.6
14	Clover alone	40,879	17.7	20,001	10.4	104.4	Tons	63,465	17.6	46,472	14.9	36.6
15	Alfalfa	3,151,675	42.2	2,216,628	50.1	42.2	Tons	8,430,766	51.6	6,524,498	58.3	29.2
16	Other tame grasses	254,313	15.9	219,035	14.1	16.1	Tons	316,803	15.2	335,977	16.4	−5.7
17	Wild, salt, or prairie grasses	1,034,507	7.8	1,530,669	11.7	32.4	Tons	951,345	8.7	1,627,804	12.5	−41.6
18	Small grains cut for hay	291,697	7.0	208,634	7.4	39.8	Tons	372,739	9.5	305,050	8.4	22.2
19	Annual legumes cut for hay	19,851	9.8	(2)	.....	.....	Tons	28,334	11.4	(2)	.....	.....
20	Silage crops	56,424	9.2	(2)	.....	.....	Tons	388,830	13.3	(2)	.....	.....
21	Corn cut for forage	36,689	1.6	(2)	.....	.....	Tons	87,389	2.5	(2)	.....	.....
22	Kafir, sorghum, etc., for forage	51,981	1.2	(2)	.....	.....	Tons	106,035	1.5	(2)	.....	.....
23	Root crops for forage	2,631	9.4	(2)	.....	.....	Tons	19,543	6.5	(2)	.....	.....
	Vegetables:											
24	Potatoes	154,194	23.0	148,712	21.2	3.7	Bu.	22,978,739	40.7	22,267,845	30.3	3.2
25	Cantaloupes and muskmelons	20,874	60.3	(2)	.....	.....	.....	.....	.....	.....	.....	.....
26	Tomatoes	20,649	41.6	(2)	.....	.....	.....	.....	.....	.....	.....	.....
	Orchard fruits:											
27	Grapes	[5] 73,675,084	46.7	(2)	.....	.....	Lbs.	1,131,279,429	54.4	(2)	.....	.....
28	Apples	[6] 9,085,326	35.2	(2)	.....	.....	Bu.	22,406,306	44.0	(2)	.....	.....
29	Peaches	[6] 7,062,692	35.6	(2)	.....	.....	Bu.	13,224,500	47.2	(2)	.....	.....
30	Pears	[6] 1,849,429	35.9	(2)	.....	.....	Bu.	3,479,806	43.2	(2)	.....	.....
31	Plums and prunes	[6] 4,306,976	29.7	(2)	.....	.....	Bu.	7,074,240	40.9	(2)	.....	.....
32	Cherries	[6] 667,907	22.5	(2)	.....	.....	Bu.	578,354	29.0	(2)	.....	.....
	Subtropical fruits:											
33	Oranges	8,711,152	84.1	(2)	.....	.....	Boxes	18,774,366	86.4	(2)	.....	.....
34	Lemons	2,299,716	79.6	(2)	.....	.....	Boxes	5,776,149	88.1	(2)	.....	.....
	Miscellaneous:											
35	Sugar beets grown for sugar	377,655	81.0	174,071	68.0	117.0	Tons	3,567,522	82.8	2,074,301	70.5	72.0
36	Cotton	214,576	1.5	(2)	.....	.....	Bales	113,862	2.8	(2)	.....	.....

[1] A minus sign (−) denotes decrease.
[2] Not reported separately in 1909.
[3] Quantity harvested and value given for irrigated land were not tabulated separately. The totals given include small amounts representing rice grown without irrigation.
[4] Not including red clover seed.
[5] Number of vines of bearing age.
[6] Number of trees of bearing age.

CROPS.

TABLE 18.—ACREAGE, YIELD, AND VALUE OF PRINCIPAL CROPS GROWN ON IRRIGATED LAND, AND COMPARISONS WITH TOTALS FOR THE STATES INCLUDED: 1919 AND 1909—Continued.

[Totals for the states included, used in making comparisons, are reported in the state bulletins on agriculture.]

	CROP.	AVERAGE YIELD PER ACRE, 1919.						VALUE.				
					On irrigated land.			1919		1909		
		Unit.	For states included.	On nonirrigated land.	Average.	Per cent of average for states included.	Per cent of average on nonirrigated land.	Amount.	Per cent of total for states included.	Amount.	Per cent of total for states included.	Per cent of increase.[1]
	Cereals:											
1	Corn	Bu.	21.9	21.8	28.6	130.6	131.2	$11,692,813	1.8	$2,421,420	0.8	383.1
2	Oats	Bu.	26.5	26.5	28.8	108.7	108.7	9,534,495	3.7	14,055,424	12.4	−32.2
3	Winter wheat	Bu.	14.1	14.1	18.7	132.6	132.6	15,269,840	1.8	12,839,582	3.5	311.4
4	Spring wheat	Bu.	8.2	7.6	20.1	245.1	264.5	37,556,853	11.4			
5	Barley	Bu.	17.9	17.3	25.7	143.6	148.6	10,775,076	11.2	4,395,928	8.4	145.1
6	Rye	Bu.	7.4	7.4	8.9	120.3	120.3	295,987	0.7	70,065	4.4	322.4
7	Kafir, milo, etc.	Bu.	19.9	19.6	26.8	134.7	136.7	6,725,561	7.5	[2]	.....	.....
8	Rough rice[3]	Bu.	39.2	4.1	39.2	100.0	956.0	96,368,090	99.9	[2]	.....	.....
	Other grains and seeds:											
9	Clover and alfalfa seed[4]	Bu.	21.0	1.4	4.1	19.5	292.9	3,461,762	46.8	765,775	37.5	352.1
10	Dry beans, navy, etc.	Bu.	11.8	10.3	16.1	136.4	156.3	12,986,298	34.6	570,193	8.3	.....
11	Dry peas, Canada	Bu.	10.8	10.0	12.4	114.8	124.0	2,042,455	36.6	358,568	29.3	469.6
	Hay and forage:											
12	Timothy alone	Tons.	1.12	1.09	1.27	113.4	116.5	4,582,905	23.0	3,210,820	26.2	42.7
13	Timothy and clover mixed	Tons.	1.48	1.50	1.45	98.0	96.7	13,782,635	42.5	3,071,935	18.8	348.7
14	Clover alone	Tons.	1.56	1.56	1.55	99.4	99.4	1,334,600	18.8	381,763	14.0	249.6
15	Alfalfa	Tons.	2.19	1.84	2.68	122.4	145.7	186,391,209	54.0	50,850,033	59.6	266.5
16	Other tame grasses	Tons.	1.31	1.32	1.25	95.4	94.7	6,473,377	17.4	2,564,966	17.5	152.4
17	Wild, salt, or prairie grasses	Tons.	0.83	0.82	0.92	110.8	112.2	17,954,630	11.2	11,734,258	18.4	53.0
18	Small grains cut for hay	Tons.	0.95	0.92	1.28	134.7	139.1	8,448,901	9.8	2,983,171	7.2	183.2
19	Annual legumes cut for hay	Tons.	1.22	1.20	1.43	117.2	119.2	494,052	10.1	[2]	.....	.....
20	Silage crops	Tons.	4.75	4.54	6.89	145.1	151.8	3,831,525	14.6	[2]	.....	.....
21	Corn cut for forage	Tons.	1.52	1.51	2.38	156.6	157.6	1,121,730	2.8	[2]	.....	.....
22	Kafir, sorghum, etc., for forage	Tons.	1.69	1.68	2.04	120.7	121.4	1,614,325	1.6	[2]	.....	.....
23	Root crops for forage	Tons.	10.77	11.11	7.43	69.0	66.9	340,329	6.7	[2]	.....	.....
	Vegetables:											
24	Potatoes	Bu.	84.3	64.9	149.0	176.7	229.6	50,778,993	40.3	8,965,658	27.1	466.4
25	Cantaloupes and muskmelons	.....	.....	.....	.....	.....	.....	3,853,037	66.6	[2]	.....	.....
26	Tomatoes	.....	.....	.....	.....	.....	.....	2,701,968	39.1	[2]	.....	.....
	Orchard fruits:											
27	Grapes	Lbs.	[5] 13.2	[5] 11.3	[5] 15.4	116.7	136.3	36,304,252	53.8	[2]	.....	.....
28	Apples	Bu.	[6] 2.0	[6] 1.7	[6] 2.5	125.0	147.1	24,566,584	28.6	[2]	.....	.....
29	Peaches	Bu.	[6] 1.4	[6] 1.2	[6] 1.9	135.7	158.3	24,670,264	49.2	[2]	.....	.....
30	Pears	Bu.	[6] 1.6	[6] 1.4	[6] 1.9	118.8	135.7	4,695,848	32.9	[2]	.....	.....
31	Plums and prunes	Bu.	[6] 1.2	[6] 1.0	[6] 1.6	133.3	160.0	15,188,490	41.1	[2]	.....	.....
32	Cherries	Bu.	[6] 0.7	[6] 0.6	[6] 0.9	128.6	150.0	2,130,891	29.4	[2]	.....	.....
	Subtropical fruits:											
33	Oranges	Boxes.	2.1	1.8	2.2	104.8	122.2	58,244,422	86.4	[2]	.....	.....
34	Lemons	Boxes.	2.3	1.3	2.5	108.7	192.3	16,750,832	88.1	[2]	.....	.....
	Miscellaneous:											
35	Sugar beets grown for sugar	Tons.	9.24	8.38	9.45	102.3	112.8	38,831,339	82.2	10,042,721	69.8	286.7
36	Cotton	Bales.	0.28	0.28	0.53	189.3	189.3	30,457,881	4.3	[2]	.....	.....

[1] A minus sign (−) denotes decrease. Per cent not shown when more than 1,000.
[2] Not reported separately in 1909.
[3] Quantity harvested and value given for irrigated land were not tabulated separately. The totals given include small amounts representing rice grown without irrigation.
[4] Not including red clover seed.
[5] Yield per vine.
[6] Yield per tree.

STATE TABLE I.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910.

[A minus sign (—) denotes decrease. Per cent not shown when more than 1,000.]

		States included.	Arizona.	Arkansas.	California.	Colorado.	Idaho.
1	Number of all farms in 1920	1,916,391	9,975	232,604	117,670	59,934	42,106
2	Number of farms irrigated in 1919	231,541	6,605	1,166	67,391	28,756	25,283
3	Per cent of all farms	12.1	66.2	0.5	57.3	48.0	60.0
4	Number of farms irrigated in 1909	162,723	4,841	232	39,352	25,857	16,439
5	Per cent of increase, 1909–1919	42.3	36.4	402.6	71.3	11.2	53.8
	LAND AND FARM AREA.						
6	Approximate land area—acres	1,223,989,120	72,838,400	33,616,000	99,617,280	66,341,120	53,346,560
7	All land in farms—acres	505,440,954	5,802,126	17,456,750	29,365,667	24,462,014	8,375,873
8	Improved land in farms—acres	214,689,819	712,803	9,210,556	11,878,339	7,744,757	4,511,680
9	Area irrigated in 1919—acres	19,191,716	467,565	143,946	4,219,040	3,348,385	2,488,806
10	Per cent of improved land in farms	8.9	65.6	1.6	35.5	43.2	55.2
11	Area irrigated in 1909—acres	14,433,285	320,051	27,753	2,664,104	2,792,032	1,430,848
12	Per cent of increase, 1909–1919	33.0	46.1	418.7	58.4	19.9	73.9
13	Area enterprises were capable of irrigating in 1920—acres	26,020,477	627,303	179,013	5,894,466	3,855,348	3,092,810
14	Area enterprises were capable of irrigating in 1910—acres	20,285,403	387,655	47,136	3,619,378	3,990,166	2,388,959
15	Per cent of increase, 1910–1920	28.3	61.8	279.8	62.9	—3.4	29.5
16	Area included in enterprises in 1920—acres	35,890,821	813,153	246,480	7,805,207	5,220,588	3,780,048
17	Area included in enterprises in 1910—acres	32,245,464	944,090	52,883	5,490,360	5,917,457	3,549,573
18	Per cent of increase, 1910–1920	11.3	—13.9	366.1	42.2	—11.8	6.5
19	Area of irrigated land reported as available for settlement—acres	2,257,981	24,341	.....	533,981	274,282	118,334
	IRRIGATION WORKS.						
	Independent enterprises:						
20	Number, 1920	63,298	1,388	944	24,115	6,634	3,629
21	Number, 1910	56,858	1,269	310	13,970	9,065	3,092
	Main ditches:						
22	Number, 1920	51,621	1,295	84	6,040	8,867	4,553
23	Number, 1910	46,677	891	217	8,590	8,405	3,209
24	Length, 1920—miles	103,177	1,769	68	14,437	19,022	11,144
25	Length, 1910—miles	88,927	1,727	131	12,620	17,564	7,662
26	Capacity, 1920—second-feet	631,079	11,707	1,205	115,237	119,558	86,273
27	Capacity, 1910—second-feet	618,097	17,200	.....	89,597	148,483	80,458
	Laterals:						
28	Number, 1920	57,553	1,174	50	9,190	6,185	5,265
29	Number, 1910	36,513	313	.....	6,143	5,612	3,350
30	Length, 1920—miles	56,687	1,599	18	12,947	8,571	6,154
31	Length, 1910—miles	39,003	870	.....	8,509	5,006	5,097
	Reservoirs:						
32	Number, 1920	7,538	440	16	3,030	979	249
33	Number, 1910	6,956	402	19	1,583	1,084	243
34	Capacity, 1920—acre-feet	21,246,436	1,510,856	20	1,091,394	2,406,372	3,493,511
35	Capacity, 1910—acre-feet	12,602,924	1,349,938	3	743,209	2,646,593	1,742,303
	Flowing wells:						
36	Number, 1920	4,606	310	.....	1,415	476	142
37	Number, 1910	5,071	214	.....	2,361	313	62
38	Capacity, 1920—gallons per minute	935,057	14,547	.....	287,187	20,139	15,133
39	Capacity, 1910—gallons per minute	1,345,676	9,953	.....	477,343	41,989	7,200
	Pumped wells:						
40	Number, 1920	32,094	999	1,089	25,401	527	53
41	Number, 1910	15,971	470	307	10,724	121	24
42	Capacity, 1920—gallons per minute	16,306,549	1,042,590	1,470,147	10,608,476	210,094	17,749
43	Capacity, 1910—gallons per minute	7,248,099	765,021	268,829	4,119,675	53,564	2,826
	Pumping plants:						
44	Number, 1920	29,458	744	1,041	21,561	406	143
45	Number, 1910	15,803	429	315	9,297	206	58
46	Engine capacity, 1920—horsepower	748,971	22,014	58,332	386,200	8,635	28,364
47	Engine capacity, 1910—horsepower	361,480	37,258	12,440	128,143	7,969	7,065
48	Pump capacity, 1920—gallons per minute	36,275,005	1,048,030	1,654,097	16,773,692	299,726	1,397,031
49	Pump capacity, 1910—gallons per minute	19,355,864	851,873	436,402	5,276,298	296,037	278,569
50	Average lift, 1920—feet	.....	44	50	41	23	29
	CAPITAL INVESTED.						
51	Capital invested to Jan. 1, 1920—dollars	667,657,328	33,498,094	7,183,322	194,886,388	88,302,442	91,501,009
52	Capital invested to July 1, 1910—dollars	321,454,008	17,677,966	587,834	72,580,030	56,636,443	40,977,088
53	Per cent of increase, 1910–1920	117.0	89.5	.....	168.5	55.9	123.3
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	26.81	53.40	40.13	33.06	22.90	29.59
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	15.85	45.60	12.47	20.05	14.19	17.15
	ESTIMATED FINAL COST.						
56	Estimated final cost of existing enterprises in 1920—dollars	819,778,005	34,615,064	7,283,522	225,799,123	95,198,423	97,019,717
57	Estimated final cost of existing enterprises in 1910—dollars	437,948,825	24,828,868	612,834	84,392,344	76,443,239	58,451,106
58	Per cent of increase, 1910–1920	87.2	39.4	.....	167.6	24.5	66.0
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	22.84	42.57	29.55	28.93	18.24	25.67
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	13.58	26.30	11.59	15.37	12.92	16.47
	DRAINAGE OF IRRIGATED LAND.						
61	Number of enterprises reporting land drained or needing drainage	3,068	31	134	545	420	206
62	Acreage included in enterprises reporting land drained or needing drainage	8,860,760	382,928	37,574	1,623,330	1,526,311	734,405
63	Acreage for which drains have been installed	1,519,853	25,173	27,350	319,573	113,899	81,187
64	Additional acreage needing drainage	1,476,771	71,357	2,821	409,933	220,711	94,934
65	Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	17.2	6.6	72.8	19.7	7.5	11.1
66	Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises	4.2	3.1	11.1	4.1	2.2	2.1
67	Per cent that acreage for which drains have been installed, plus that needing drainage is of total acreage included in irrigation enterprises	8.3	11.9	12.2	9.3	6.4	4.7

STATE TABLE I.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (—) denotes decrease. Per cent not shown when base is less than 100.]

		Kansas.	Louisiana.	Montana.	Nebraska.	Nevada.	New Mexico.	North Dakota.
1	Number of all farms in 1920	165,286	135,463	57,677	124,417	3,163	29,844	77,690
2	Number of farms irrigated in 1919	504	6,471	10,807	3,021	2,718	11,390	340
3	Per cent of all farms	0.3	4.8	18.7	2.4	85.9	38.2	0.4
4	Number of farms irrigated in 1909	1,006	2,690	8,970	1,852	2,406	12,795	69
5	Per cent of increase, 1909–1919	—49.9	140.6	20.5	63.1	13.0	—11.0	
	LAND AND FARM AREA.							
6	Approximate land area—acres	52,335,360	29,061,760	93,523,840	49,157,120	70,285,440	78,401,920	44,917,120
7	All land in farms—acres	45,425,179	10,019,822	35,070,656	42,225,475	2,357,163	24,409,633	36,214,751
8	Improved land in farms—acres	30,600,760	5,626,226	11,007,278	23,109,624	594,741	1,717,224	24,563,178
9	Area irrigated in 1919—acres	47,312	454,882	1,681,729	442,690	561,447	538,377	12,072
10	Per cent of improved land in farms	0.2	8.1	15.3	1.9	94.4	31.4	(1)
11	Area irrigated in 1909—acres	37,479	380,200	1,679,084	255,950	701,833	461,718	10,248
12	Per cent of increase, 1909–1919	26.2	19.6	0.2	73.0	—20.0	16.6	17.8
13	Area enterprises were capable of irrigating in 1920—acres	67,853	728,742	2,753,498	562,468	704,708	696,119	34,235
14	Area enterprises were capable of irrigating in 1910—acres	139,995	553,220	2,205,155	429,225	840,962	644,970	21,917
15	Per cent of increase, 1910–1920	—51.5	31.7	24.9	31.0	—16.2	7.9	56.2
16	Area included in enterprises in 1920—acres	102,562	851,211	4,329,148	766,768	1,382,036	961,879	57,476
17	Area included in enterprises in 1910—acres	161,300	581,965	3,515,602	680,133	1,232,142	1,102,297	38,173
18	Per cent of increase, 1910–1920	—36.4	46.3	23.1	12.7	12.2	—12.7	50.6
19	Area of irrigated land reported as available for settlement—acres			207,530		139,352	66,479	
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	209	1,373	6,035	470	1,015	2,391	30
21	Number, 1910	716	1,237	5,534	474	1,347	2,786	49
	Main ditches:							
22	Number, 1920	139	1,298	8,819	513	2,032	2,228	32
23	Number, 1910	89	515	6,673	420	994	2,101	47
24	Length, 1920—miles	271	1,584	16,411	1,780	3,123	4,469	58
25	Length, 1910—miles	274	729	12,990	1,459	1,938	4,664	52
26	Capacity, 1920—second-feet	1,667	11,889	94,429	11,665	10,554	23,432	836
27	Capacity, 1910—second-feet	2,600		83,849	9,378	17,579	29,646	2,161
	Laterals:							
28	Number, 1920	374	3,908	10,680	913	2,064	2,158	58
29	Number, 1910	39	180	8,307	1,038	1,531	1,280	46
30	Length, 1920—miles	147	1,659	6,085	1,545	1,245	1,463	93
31	Length, 1910—miles	42	439	5,944	1,269	1,213	1,190	74
	Reservoirs:							
32	Number, 1920	36	74	468	59	134	328	9
33	Number, 1910	42	104	827	44	109	522	22
34	Capacity, 1920—acre-feet	391	7,632	1,571,720	197,890	504,428	2,960,718	1,110
35	Capacity, 1910—acre-feet	31,024	19,482	580,261	2,098	325,953	454,162	132,187
	Flowing wells:							
36	Number, 1920	6	9	41		123	556	
37	Number, 1910	3		15		19	673	
38	Capacity, 1920—gallons per minute	500	6,255	4,608		21,942	376,222	
39	Capacity, 1910—gallons per minute	30		22,185		1,302	669,268	
	Pumped wells:							
40	Number, 1920	710	812	22	34	129	461	
41	Number, 1910	930	606	10	66	6	466	1
42	Capacity, 1920—gallons per minute	266,797	1,607,637	11,085	24,701	6,798	265,618	
43	Capacity, 1910—gallons per minute	73,362	1,108,236	5,263	3,363	1,349	190,690	15
	Pumping plants:							
44	Number, 1920	198	1,250	253	51	64	472	4
45	Number, 1910	698	1,007	125	75	18	413	4
46	Engine capacity, 1920—horsepower	6,946	85,628	10,341	959	409	8,488	2,068
47	Engine capacity, 1910—horsepower	1,517	57,426	3,511	140	693	14,226	2,038
48	Pump capacity, 1920—gallons per minute	297,075	4,968,686	453,231	73,686	35,266	304,789	51,250
49	Pump capacity, 1910—gallons per minute	128,276	5,064,173	281,199	5,366	24,295	216,355	182,115
50	Average lift, 1920—feet	30	32	20	24	22	40	38
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920—dollars	2,067,381	14,063,181	52,143,363	13,909,185	14,754,280	18,210,412	1,857,118
52	Capital invested to July 1, 1910—dollars	1,365,563	6,859,166	22,970,958	7,798,310	6,721,924	9,154,897	836,482
53	Per cent of increase, 1910–1920	51.4	105.0	127.0	78.4	119.5	98.9	122.0
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	30.47	19.30	18.94	24.73	20.94	26.16	54.25
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	9.75	12.40	10.42	18.17	7.99	14.19	38.17
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920—dollars	2,195,981	14,264,178	70,079,028	18,030,154	22,648,747	20,440,646	2,072,766
57	Estimated final cost of existing enterprises in 1910—dollars	1,365,563	6,914,166	32,382,077	9,485,231	12,188,756	11,640,091	836,482
58	Per cent of increase, 1910–1920	60.8	106.3	116.4	90.1	85.8	75.6	147.8
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	21.41	16.76	16.19	23.51	16.39	21.25	36.06
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	8.47	11.88	9.21	13.95	9.89	10.56	21.91
	DRAINAGE OF IRRIGATED LAND.							
61	Number of enterprises reporting land drained or needing drainage	5	406	276	24	58	203	8
62	Acreage included in enterprises reporting land drained or needing drainage	3,610	283,476	751,274	376,518	537,417	212,353	49,581
63	Acreage for which drains have been installed	250	167,138	62,872	10,793	34,175	74,783	1,613
64	Additional acreage needing drainage	1,320	21,202	50,901	26,606	98,249	60,277	659
65	Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	6.9	59.0	8.4	2.9	6.4	35.2	3.3
66	Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises	0.2	19.6	1.5	1.4	2.5	7.8	2.8
67	Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises	1.5	22.1	2.6	4.9	9.6	14.0	4.0

[1] Less than one-tenth of 1 per cent.

STATE TABLE I.—ACREAGE IRRIGATED, 1919 AND 1909; AND ACREAGE IN ENTERPRISES, IRRIGATION WORKS, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES, 1920 AND 1910—Continued.

[A minus sign (−) denotes decrease.]

		Oklahoma.	Oregon.	South Dakota.	Texas.	Utah.	Washington.	Wyoming.
1	Number of all farms in 1920	191,988	50,206	74,637	436,033	25,662	66,288	15,748
2	Number of farms irrigated in 1919	73	9,154	1,198	14,726	22,218	13,271	6,449
3	Per cent of all farms	(1)	18.2	1.6	3.4	86.6	20.0	41.0
4	Number of farms irrigated in 1909	137	6,669	500	5,238	19,709	7,604	6,297
5	Per cent of increase, 1909–1919	−46.7	37.3	139.6	181.1	12.7	73.2	2.4
	LAND AND FARM AREA.							
6	Approximate land area—acres	44,424,960	61,188,480	49,195,520	167,934,720	52,597,760	42,775,040	62,430,720
7	All land in farms—acres	31,951,934	13,542,318	34,636,491	114,020,621	5,050,410	13,244,720	11,809,351
8	Improved land in farms—acres	18,125,321	4,913,851	18,199,250	31,227,503	1,715,380	7,129,343	2,102,005
9	Area irrigated in 1919—acres	2,999	986,162	100,682	586,120	1,371,651	520,899	1,207,982
10	Per cent of improved land in farms	(1)	20.1	0.6	1.9	80.0	7.4	57.5
11	Area irrigated in 1909—acres	4,388	686,129	63,248	451,130	999,410	334,378	1,133,302
12	Per cent of increase, 1909–1919	−32.3	43.7	59.2	29.9	37.2	58.5	6.6
13	Area enterprises were capable of irrigating in 1920—acres	9,672	1,344,046	150,914	1,150,542	1,700,550	637,151	1,831,039
14	Area enterprises were capable of irrigating in 1910—acres	6,397	830,526	128,481	690,991	1,250,246	470,514	1,639,510
15	Per cent of increase, 1910–1920	51.2	61.8	17.5	66.5	36.0	35.4	11.7
16	Area included in enterprises in 1920—acres	11,742	1,925,987	188,382	1,687,447	2,359,244	836,795	2,564,668
17	Area included in enterprises in 1910—acres	8,528	2,527,208	201,625	1,253,173	1,947,625	817,032	2,224,298
18	Per cent of increase, 1910–1920	37.7	−23.8	−6.6	34.7	21.1	2.4	15.3
19	Area of irrigated land reported as available for settlement—acres	.....	98,609	.....	346,446	189,563	61,738	197,326
	IRRIGATION WORKS.							
	Independent enterprises:							
20	Number, 1920	33	4,710	292	1,371	2,403	2,692	3,564
21	Number, 1910	114	3,745	395	2,772	2,472	1,934	5,577
	Main ditches:							
22	Number, 1920	18	5,252	370	820	2,381	1,873	5,007
23	Number, 1910	47	3,582	348	861	2,495	1,600	5,593
24	Length, 1920—miles	38	7,115	653	1,524	6,343	3,851	9,517
25	Length, 1910—miles	54	5,539	631	1,479	5,887	2,594	10,933
26	Capacity, 1920—second-feet	344	28,897	5,427	23,261	29,447	16,242	39,009
27	Capacity, 1910—second-feet	155	39,686	3,598	12,818	25,081	13,178	42,630
	Laterals:							
28	Number, 1920	72	2,784	632	2,022	4,068	3,179	2,777
29	Number, 1910	106	2,518	332	832	1,357	1,180	2,340
30	Length, 1920—miles	19	1,956	605	2,949	5,334	1,764	2,534
31	Length, 1910—miles	31	2,052	625	1,224	1,822	1,298	2,298
	Reservoirs:							
32	Number, 1920	8	266	119	368	476	205	374
33	Number, 1910	11	271	314	309	480	156	414
34	Capacity, 1920—acre-feet	52	1,905,037	212,264	392,999	1,600,505	477,789	2,911,748
35	Capacity, 1910—acre-feet	22	1,024,266	216,205	74,361	588,317	121,543	2,550,937
	Flowing wells:							
36	Number, 1920	1	65	4	135	1,256	60	7
37	Number, 1910	.....	51	42	123	1,138	55	2
38	Capacity, 1920—gallons per minute	100	11,968	2,750	62,364	96,371	14,925	46
39	Capacity, 1910—gallons per minute	.....	3,035	14,382	37,019	42,794	18,926	250
	Pumped wells:							
40	Number, 1920	19	208	1	901	192	520	16
41	Number, 1910	65	92	4	1,912	27	128	3
42	Capacity, 1920—gallons per minute	3,643	47,026	800	538,565	39,059	227,744	8,020
43	Capacity, 1910—gallons per minute	1,791	20,883	24	567,126	4,827	60,220	835
	Pumping plants:							
44	Number, 1920	22	573	25	1,369	250	975	57
45	Number, 1910	68	220	8	2,359	69	391	34
46	Engine capacity, 1920—horsepower	184	13,769	408	80,511	11,392	22,929	1,304
47	Engine capacity, 1910—horsepower	107	3,095	63	69,094	2,143	13,847	705
48	Pump capacity, 1920—gallons per minute	7,668	600,045	23,320	6,825,998	783,588	636,552	39,725
49	Pump capacity, 1910—gallons per minute	4,541	118,514	5,289	5,362,065	315,057	365,411	142,529
50	Average lift, 1920—feet	59	28	21	.....	25	60	31
	CAPITAL INVESTED.							
51	Capital invested to Jan. 1, 1920—dollars	151,325	28,929,151	5,465,248	35,072,739	32,037,351	20,299,011	34,326,328
52	Capital invested to July 1, 1910—dollars	47,200	12,760,214	3,043,140	13,487,347	14,028,717	16,219,149	17,700,980
53	Per cent of increase, 1910–1920	220.6	126.7	79.6	160.0	128.4	80.6	93.9
54	Average cost per acre based on area enterprises were capable of supplying with water in 1920—dollars	15.65	21.52	36.21	30.48	18.84	45.98	18.75
55	Average cost per acre based on area enterprises were capable of supplying with water in 1910—dollars	7.38	15.36	23.69	19.52	11.22	34.47	10.80
	ESTIMATED FINAL COST.							
56	Estimated final cost of existing enterprises in 1920—dollars	162,775	41,585,742	5,500,748	39,860,871	33,835,641	37,684,591	51,500,288
57	Estimated final cost of existing enterprises in 1910—dollars	47,200	39,216,619	3,800,556	14,754,172	17,840,775	22,322,856	20,425,890
58	Per cent of increase, 1910–1920	244.9	6.0	44.7	170.2	89.7	68.8	152.1
59	Average cost per acre based on estimated final cost and area included in enterprises in 1920—dollars	13.86	21.59	29.20	23.62	14.34	45.03	20.08
60	Average cost per acre based on estimated final cost and area included in enterprises in 1910—dollars	5.53	15.52	18.85	11.77	9.16	27.32	9.18
	DRAINAGE OF IRRIGATED LAND.							
61	Number of enterprises reporting land drained or needing drainage	3	176	17	166	143	103	144
62	Acreage included in enterprises reporting land drained or needing drainage	1,960	347,750	106,129	650,822	503,212	218,763	513,347
63	Acreage for which drains have been installed	.....	93,799	2,109	272,437	85,448	79,108	68,086
64	Additional acreage needing drainage	1,820	46,115	4,714	154,532	91,976	43,461	75,183
65	Per cent that acreage for which drains have been installed is of total acreage included in enterprises reporting drainage	.....	27.0	2.0	41.9	17.0	36.2	13.3
66	Per cent that acreage for which drains have been installed is of total acreage included in irrigation enterprises in the state	.....	4.9	1.1	16.1	3.6	9.5	2.7
67	Per cent that acreage for which drains have been installed plus that needing drainage is of total acreage included in irrigation enterprises in the state	15.5	7.3	3.6	25.3	7.5	14.7	5.6

[1] Less than one-tenth of 1 per cent.

STATE TABLE II.—TOTAL ACREAGE IRRIGATED IN 1919, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES TO 1920, CLASSIFIED BY DATE OF BEGINNING, CHARACTER OF ENTERPRISE, SOURCE OF WATER SUPPLY, AND CHARACTER OF WATER RIGHTS.

		States included.	Arizona.	Arkansas.	California.	Colorado.	Idaho.
	AREA IRRIGATED, 1919.						
	Total	**19,191,716**	**467,565**	**143,946**	**4,219,040**	**3,348,385**	**2,488,806**
	Date of beginning:						
1	Before 1860	299,784	332	.....	108,200	37,742	931
2	1860–1869	1,282,705	720	.....	88,485	634,865	48,536
3	1870–1879	2,588,414	55,327	.....	1,039,852	647,771	144,031
4	1880–1889	4,043,391	41,358	.....	347,685	1,155,088	755,533
5	1890–1899	2,538,913	19,975	1,640	404,133	294,493	383,053
6	1900–1904	2,211,749	10,944	470	456,261	210,673	619,677
7	1905–1909	2,549,927	260,639	11,840	290,086	215,729	354,143
8	1910–1914	1,538,644	18,692	49,100	649,875	80,674	90,870
9	1915–1919	1,165,560	42,595	64,474	541,500	19,885	60,355
10	Not reported	972,629	16,983	16,422	292,963	51,465	31,677
	Character of enterprise:						
11	Individual and partnership	6,848,807	80,511	140,471	1,502,870	1,014,412	513,350
12	Cooperative	6,581,400	114,482	1,075	1,215,696	1,789,385	938,421
13	Irrigation district	1,822,887	300	.....	577,168	248,409	355,995
14	Carey Act	523,929	.....	.....	.....	2,430	383,833
15	Commercial	1,822,001	14,500	2,400	873,499	212,138	6,503
16	U. S. Reclamation Service	1,254,569	248,814	.....	36,622	71,145	253,759
17	U. S. Indian Service	284,551	8,733	.....	697	4,266	36,775
18	State	5,620	.....	.....	2,936	80	10
19	City	40,146	200	.....	6,213	5,825	160
20	Other and mixed	7,236	25	.....	3,064	.....	.....
21	Not reported	570	.....	.....	275	295	.....
	Source of water supply:						
22	Streams, gravity	14,527,060	189,782	120	2,564,445	3,028,787	2,274,959
23	Streams, pumped	1,226,510	6,671	6,009	295,673	12,747	107,181
24	Streams, pumped and gravity	199,595	.....	.....	60,278	9,430	1,870
25	Wells, pumped	1,263,098	39,694	135,260	826,846	10,114	414
26	Wells, flowing	65,856	1,558	.....	17,653	4,191	1,131
27	Wells, pumped and flowing	35,685	558	.....	23,561	85	.....
28	Lakes, pumped	35,730	5	450	4,168	871	4,912
29	Lakes, gravity	100,646	.....	.....	48,084	2,867	2,492
30	Springs	198,008	2,578	.....	27,698	10,856	33,337
31	Stored storm water	98,873	510	40	20,351	16,909	2,590
32	City water	930	.....	.....	515	11	.....
33	Sewage	2,578	195	.....	1,385	195	80
34	Streams, gravity, and pumped wells	344,713	217,799	250	87,897	16,258	357
35	Streams, gravity, and flowing wells	82,665	525	.....	4,255	67,880	1,927
36	Other mixed	996,621	7,690	1,817	228,424	165,825	54,601
37	Other and not reported	13,148	.....	.....	7,807	1,359	2,955
	Character of water rights:						
38	Appropriation and use	2,521,682	226,846	(1)	479,361	114,616	130,774
39	Notice filed and posted	2,765,636	97,130	.....	704,608	209,262	238,637
40	Adjudicated by court	7,159,954	84,978	.....	982,157	2,918,383	1,104,607
41	Permit from state	1,960,924	10	.....	80,484	.....	490,979
42	Certificate or license from state	1,288,124	.....	.....	25,484	.....	338,958
43	Riparian rights	370,896	.....	.....	240,512	.....	18,389
44	Underground	1,067,606	41,624	.....	863,613	14,558	1,834
45	Other and mixed	494,564	525	.....	396,703	12,275	55,595
46	Not reported	1,562,330	16,452	143,946	446,118	79,291	109,033
	CAPITAL INVESTED, 1920.						
	Total	**$697,657,328**	**$33,498,094**	**$7,183,322**	**$194,886,388**	**$88,302,442**	**$91,501,009**
	Date of beginning:						
47	Before 1860	9,527,597	2,058	.....	6,802,109	265,660	3,137
48	1860–1869	24,130,038	9,770	.....	2,589,615	14,410,037	881,963
49	1870–1879	37,722,304	1,881,284	.....	16,475,201	8,150,179	1,024,629
50	1880–1889	76,427,344	921,806	.....	19,046,449	17,150,419	13,791,700
51	1890–1899	77,443,017	645,369	93,111	31,330,191	7,043,688	9,088,738
52	1900–1904	95,749,105	437,719	25,026	19,106,308	14,101,894	25,892,006
53	1905–1909	183,980,169	20,951,874	459,542	15,252,978	14,192,032	34,081,217
54	1910–1914	102,507,009	3,778,003	2,276,584	41,765,378	11,479,877	3,795,869
55	1915–1919	67,613,693	4,419,044	3,302,492	32,996,398	550,890	2,227,426
56	Not reported	22,557,052	451,167	1,026,567	9,521,261	956,866	714,324
	Character of enterprise:						
57	Individual and partnership	154,634,169	5,508,625	7,073,297	57,616,716	11,599,883	5,747,004
58	Cooperative	183,041,500	3,171,406	60,013	48,899,448	42,911,035	36,576,664
59	Irrigation district	88,573,514	100,000	.....	33,985,301	16,269,026	11,954,046
60	Carey Act	32,680,695	.....	.....	.....	1,205,988	17,772,590
61	Commercial	85,735,470	3,693,400	50,012	44,996,723	5,711,887	698,179
62	U. S. Reclamation Service	129,509,819	20,277,919	.....	2,398,220	10,253,231	17,804,839
63	U. S. Indian Service	14,851,236	585,029	.....	55,556	220,979	932,387
64	State	344,174	.....	.....	224,909	3,994	1,000
65	City	2,936,678	71,500	.....	1,401,320	117,665	14,300
66	Other	5,310,399	.....	.....	5,277,490	.....	.....
67	Not reported	39,674	215	.....	30,705	8,754	.....
	Source of water supply:						
68	Streams, gravity	439,570,623	11,587,884	3,874	78,139,147	68,852,489	81,823,379
69	Streams, pumped	59,343,298	521,852	96,450	16,267,561	2,490,000	5,108,912
70	Streams, pumped and gravity	9,512,907	.....	.....	3,084,038	397,392	168,200
71	Wells, pumped	76,787,251	3,417,339	7,028,773	54,057,185	375,277	24,935
72	Wells, flowing	2,945,059	115,936	.....	807,353	55,251	33,652
73	Wells, pumped and flowing	2,498,672	54,700	.....	1,776,156	5,300	.....
74	Lakes, pumped	2,274,601	400	9,500	90,081	27,530	544,981
75	Lakes, gravity	2,906,612	.....	.....	674,320	84,935	276,837
76	Springs	5,793,988	271,358	.....	1,298,308	188,920	980,189
77	Stored storm water	15,075,592	11,600	1,500	6,593,659	1,467,459	246,257
78	City water	219,783	.....	.....	61,055	97	.....
79	Sewage	174,444	63,408	.....	59,959	1,648	200
80	Streams, gravity, and pumped wells	28,347,835	17,092,890	8,500	10,001,650	190,454	59,700
81	Streams, gravity, and flowing wells	2,863,194	27,500	.....	1,264,530	1,033,076	39,150
82	Other mixed	48,467,251	333,227	34,725	19,906,271	13,084,359	2,181,887
83	Other and not reported	876,218	.....	.....	805,115	47,355	12,730

[1] 1919 acreage in Arkansas not classified by character of water rights.

STATE TABLE II.—ACREAGE IRRIGATED IN 1919, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES TO 1920, CLASSIFIED BY DATE OF BEGINNING, CHARACTER OF ENTERPRISE, SOURCE OF WATER SUPPLY, AND CHARACTER OF WATER RIGHTS—Continued.

		Kansas.	Louisiana.	Montana.	Nebraska.	Nevada.	New Mexico.	North Dakota.
	AREA IRRIGATED, 1919.							
	Total	**47,312**	**454,882**	**1,681,729**	**442,690**	**561,447**	**538,377**	**12,072**
	Date of beginning:							
1	Before 1860			4,586	30	4,782	28,062	
2	1860–1869			110,225		171,317	26,597	
3	1870–1879	80	40	114,804	1,090	124,723	33,720	
4	1880–1889	15,413	2,050	470,529	104,100	83,562	71,909	1 695
5	1890–1899	13,226	151,983	361,563	191,220	9,081	55,223	458
6	1900–1904		50,263	148,075	21,580	60,897	27,312	955
7	1905–1909	3,617	34,631	272,239	98,704	18,770	71,848	8,766
8	1910–1914	3,719	59,919	59,280	19,788	24,333	89,720	285
9	1915–1919	7,109	126,831	38,556	2,746	13,937	60,919	330
10	Not reported	4,148	29,165	101,872	3,423	49,545	73,067	683
	Character of enterprise:							
11	Individual and partnership	14,546	259,673	976,615	68,140	355,901	151,351	3,306
12	Cooperative	32,516	10,635	393,257	55,408	69,877	264,610	
13	Irrigation district			35,153	206,206	80,000	15,008	
14	Carey Act			54,771				
15	Commercial	150	184,574	34,115	25,335	5,990	19,871	
16	U. S. Reclamation Service			88,291	87,558	44,324	77,678	8,766
17	U. S. Indian Service			98,887		5,321	9,072	
18	State	100		20		12	77	
19	City			320		22	600	
20	Other and mixed			300	43		110	
21	Not reported							
	Source of water supply:							
22	Streams, gravity	30,807	10,226	1,515,212	435,567	466,812	432,478	9,030
23	Streams, pumped	730	248,306	15,743	1,115	2,647	1,890	2,469
24	Streams, pumped and gravity	600	12,620	19,872	850	720		
25	Wells, pumped	13,235	154,304	139	546	295	15,709	
26	Wells, flowing		196	212		811	30,030	
27	Wells, pumped and flowing	50	1,075			65	6,556	
28	Lakes, pumped		6,966	79				
29	Lakes, gravity		3,225	16,653		445	1,945	
30	Springs			14,945	2,050	21,987	10,791	
31	Stored storm water		84	3,280	1,200	17,348	6,448	508
32	City water			15	7	14	40	
33	Sewage			245	120	88		
34	Streams, gravity, and pumped wells	1,540	10,045	155	115	4,957	1,341	
35	Streams, gravity, and flowing wells			6,068		82	685	
36	Other mixed	350	7,835	89,070	1,120	45,176	29,787	65
37	Other and not reported			41			677	
	Character of water rights:							
38	Appropriation and use	26,435	(2)	229,887	42,141	200,556	152,746	6,348
39	Notice filed and posted	4,218		666,305	16,517	52,027	54,356	2,328
40	Adjudicated by court	458		701,015	9,280	161,175	91,807	
41	Permit from state			595	234,806	106,857	103,459	2,936
42	Certificate or license from state				117,960	6,666	20,096	
43	Riparian rights	30		5,500	618		400	
44	Underground	13,480		482	546	1,244	52,325	
45	Other and mixed	938		8,561	13	1,705	8	
46	Not reported	1,753	454,882	69,384	20,809	31,217	63,180	460
	CAPITAL INVESTED, 1920.							
	Total	**$2,067,381**	**$14,063,181**	**$52,143,363**	**$13,909,185**	**$14,754,280**	**$18,210,412**	**$1,857,118**
	Date of beginning:							
47	Before 1860			55,527	500	55,645	268,876	
48	1860–1869			1,323,315		2,400,682	384,754	
49	1870–1879	736	1,000	2,003,841	21,583	1,599,890	482,843	
50	1880–1889	1,058,982	24,800	5,085,794	1,659,094	1,026,933	2,568,298	18,000
51	1890–1899	88,719	5,487,222	7,045,284	2,075,677	134,494	1,202,916	17,669
52	1900–1904		1,347,322	3,005,519	321,927	8,149,026	1,122,232	37,714
53	1905–1909	200,085	1,171,166	25,592,156	8,685,843	244,493	4,692,515	1,777,570
54	1910–1914	176,286	1,502,682	2,756,019	444,144	576,638	4,594,735	2,000
55	1915–1919	407,876	3,848,822	3,631,564	180,314	234,932	2,021,448	11,207
56	Not reported	134,697	680,167	1,584,344	520,103	331,547	811,795	2,958
	Character of enterprise:							
57	Individual and partnership	775,095	7,943,252	15,543,287	1,146,227	4,014,570	5,589,372	81,093
58	Cooperative	1,289,737	161,658	6,692,877	547,104	1,019,047	3,558,863	
59	Irrigation district			1,708,851	2,811,474	1,246,611	914,479	
60	Carey Act			4,834,407			1,877,842	
61	Commercial	1,549	5,958,271	676,535	726,560	340,559	262,713	
62	U. S. Reclamation Service			14,381,318	8,674,250	7,953,537	5,020,230	1,775,425
63	U. S. Indian Service			8,193,390		178,536	691,194	
64	State	1,000		100		1,000	18,544	
65	City			105,538		420	276,299	
66	Other			7,060	3,670		876	
67	Not reported							
	Source of water supply:							
68	Streams, gravity	1,184,674	318,934	47,016,339	13,619,775	12,493,231	13,524,889	1,299,951
69	Streams, pumped	22,142	7,338,954	900,216	39,581	119,900	36,520	552,007
70	Streams, pumped and gravity	50,000	172,000	1,612,316	18,700	8,000		
71	Wells, pumped	741,583	5,366,948	16,285	23,250	19,900	925,003	
72	Wells, flowing		5,000	10,007		50,575	1,220,519	
73	Wells, pumped and flowing	4,000	22,500			5,500	388,165	
74	Lakes, pumped		356,960	8,250				
75	Lakes, gravity	1,000	112,740	271,760	100,300	234,851	18,750	
76	Springs			247,094	24,497	568,000	257,179	
77	Stored storm water		1,500	298,892	40,429	164,350	686,047	4,660
78	City water				1,000	300	1,000	
79	Sewage			6,724	313	620		
80	Streams, gravity, and pumped wells	50,532	247,595	3,000	5,035	181,887	175,000	
81	Streams, gravity, and flowing wells			433,000	6,902	3,400	14,000	
82	Other mixed	13,450	120,050	1,318,598	29,403	903,766	958,740	500
83	Other and not reported			1,382			4,600	

[1] Dakota territory.
[2] Acreage in Louisiana not classified by character of water rights.

STATE TABLE II.—ACREAGE IRRIGATED IN 1919, AND CAPITAL INVESTED IN IRRIGATION ENTERPRISES TO 1920, CLASSIFIED BY DATE OF BEGINNING, CHARACTER OF ENTERPRISE, SOURCE OF WATER SUPPLY, AND CHARACTER OF WATER RIGHTS.

		Oklahoma.	Oregon.	South Dakota.	Texas.	Utah.	Washington.	Wyoming.
	AREA IRRIGATED, 1919.							
	Total	**2,969**	**986,162**	**100,682**	**586,120**	**1,371,651**	**529,899**	**1,207,982**
	Date of beginning:							
1	Before 1860		8,206			106,132	461	320
2	1860-1869		46,917			144,957	798	9,288
3	1870-1879		90,950	11,302	23,006	201,840	22,650	77,228
4	1880-1889		198,653	11,441	13,073	300,415	65,791	406,196
5	1890-1899	2,392	123,043	2,965	45,411	113,386	126,359	239,300
6	1900-1904	108	123,648	58,570	134,332	81,407	42,534	163,543
7	1905-1909	55	142,756	8,927	161,770	250,048	175,383	169,976
8	1910-1914	298	91,425	5,633	141,116	67,466	30,663	55,288
9	1915-1919	36	62,458	1,126	34,656	44,930	24,466	18,642
10	Not reported	80	98,106	718	32,256	61,001	40,794	68,201
	Character of enterprise:							
11	Individual and partnership	969	590,626	31,664	110,680	166,887	142,215	724,020
12	Cooperative	2,000	186,037	10,080	103,378	1,014,649	93,192	286,702
13	Irrigation district		92,081		88,571	21,143	79,918	22,935
14	Carey Act		30,665			16,000		36,230
15	Commercial		27,338	2,280	262,892	70,911	21,705	57,800
16	U. S. Reclamation Service		54,981	56,638	20,284	29,285	122,869	53,555
17	U. S. Indian Service		4,000	20		25,270	69,510	22,000
18	State				65		200	2,120
19	City		330		250	24,206		2,020
20	Other and mixed		104			3,300	290	
21	Not reported							
	Source of water supply:							
22	Streams, gravity	2,522	786,354	92,491	73,982	1,105,691	352,199	1,155,596
23	Streams, pumped	188	64,576	869	421,538	10,389	26,244	1,525
24	Streams, pumped and gravity		253		350	50	92,702	
25	Wells, pumped	107	1,993		39,483	7,308	17,504	147
26	Wells, flowing	18	72	130	3,256	4,908	1,671	19
27	Wells, pumped and flowing		340		1,727	178	1,490	
28	Lakes, pumped		1,620		597	11,400	4,662	
29	Lakes, gravity		5,750	170		15,218	3,442	355
30	Springs	6	9,584	326	8,086	41,310	7,869	5,985
31	Stored storm water		3,763	2,312	11,572	977	129	10,852
32	City water	3	258			25	42	
33	Sewage		10		260			
34	Streams, gravity and pumped wells		105	500	454	125	2,415	400
35	Streams, gravity and flowing wells		200	20	45	537	441	
36	Other mixed	125	111,137	3,864	24,170	173,495	19,027	33,043
37	Other and not reported		147			40	62	60
	Character of water rights:							
38	Appropriation and use	35	148,523	1,774	69,334	469,944	196,700	25,662
39	Notice filed and posted	215	150,332	62,054	105,069	171,955	169,831	60,792
40	Adjudicated by court	2,200	293,913	7,051	2,755	581,080	56,309	162,186
41	Permit from state	310	131,540	17,500	229,753	56,061	39,608	466,026
42	Certificate or license from state		217,228	8,612	11,898	66,778	17,406	457,038
43	Riparian rights	80	14,277	1,599	72,396		17,095	
44	Underground	120	3,235	130	44,049	8,631	20,859	270
45	Other and mixed	3	12,159	190	594	4,077	561	657
46	Not reported	6	14,955	1,172	49,072	13,125	11,530	35,345
	CAPITAL INVESTED, 1920.							
	Total	**$151,325**	**$28,929,151**	**$5,465,248**	**$35,072,739**	**$32,037,351**	**$29,299,011**	**$34,326,328**
	Date of beginning:							
47	Before 1860		151,216			1,883,033	37,986	1,250
48	1860-1869		398,603		30,000	1,639,394	10,174	45,731
49	1870-1879		1,072,943	261,476	1,108,104	2,495,342	104,885	978,308
50	1880-1889		2,321,551	149,465	295,723	4,728,282	1,130,394	5,459,654
51	1890-1899	54,378	1,666,226	94,851	987,951	2,333,321	4,883,571	3,109,641
52	1900-1904	3,403	4,193,262	4,543,349	4,903,055	807,149	2,907,222	4,844,972
53	1905-1909	4,085	10,876,802	221,514	7,762,497	10,322,803	12,527,690	14,962,407
54	1910-1914	67,101	2,741,335	106,127	14,010,412	5,113,678	5,697,725	1,621,916
55	1915-1919	17,009	4,759,181	63,308	2,747,636	1,863,298	1,993,364	2,337,484
56	Not reported	5,349	748,032	25,158	3,227,361	850,451		964,905
	Character of enterprise:							
57	Individual and partnership	110,658	6,584,382	743,880	8,256,568	2,736,804	4,733,970	8,738,886
58	Cooperative	40,667	3,143,698	240,030	3,821,844	20,254,212	3,951,207	6,701,990
59	Irrigation district		6,313,753		5,449,142	265,484	6,114,035	1,441,312
60	Carey Act		3,231,298			1,323,779		2,434,791
61	Commercial		3,281,034	15,058	13,825,409	2,374,991	2,342,028	780,562
62	U. S. Reclamation Service		5,956,950	4,464,780	3,673,476	3,567,057	10,444,717	12,863,870
63	U. S. Indian Service		230,038	1,500		765,354	1,057,386	1,339,887
64	State		16,107		6,802		55,068	15,050
65	City		171,068		39,498	729,090		9,980
66	Other		823			20,580		
67	Not reported							
	Source of water supply:							
68	Streams, gravity	90,040	20,028,187	5,122,271	5,631,241	26,503,402	19,305,396	33,025,460
69	Streams, pumped	4,210	2,807,806	93,340	19,432,010	733,077	2,677,946	99,914
70	Streams, pumped and gravity		3,700		60,000	5,100	3,933,461	
71	Wells, pumped	47,075	118,306		2,783,200	153,091	1,678,581	10,460
72	Wells, flowing	5,000	6,900	5,000	340,538	107,152	117,546	4,630
73	Wells, pumped and flowing		2,600		163,057	18,571	58,123	
74	Lakes, pumped		26,583		176,700	565,000	408,616	
75	Lakes, gravity		783,702	2,100		75,281	205,101	4,935
76	Springs	1,000	165,946	18,421	316,664	869,214	520,899	66,299
77	Stored storm water		124,499	155,121	4,785,276	81,803	5,985	407,055
78	City water	1,500	153,650			800	381	
79	Sewage		1,500		40,072			
80	Streams, gravity, and pumped wells		11,500	3,000	34,680	22,000	243,642	16,770
81	Streams, gravity, and flowing wells		1,000	480	5,000	11,822	23,334	
82	Other mixed	2,500	4,691,072	65,515	1,304,241	2,828,242		690,705
83	Other and not reported		2,200			2,736		100